SL-F60PS
RMT-231

SERVICE MANUAL

West Germany Model

October, 1984

711B2 CHASSIS

This manual contains the adjustment method.

SPECIFICATIONS

System

Video recording system	Rotary two-head helical scanning
Video signal	CCIR standards, PAL and DDR SECAM colour
Aerial input	75-ohm, asymmetrical aerial socket
Channel coverage	VHF: Western European channels E2-U20 UHF: Western European channels E21-E68 (Up to 30 programmes can be preset.)
RF output signal	UHF channels E30 to E39 (variable) 75 ohms, unbalanced

Video

Input	VIDEO IN: BNC connector 1.0 V $^{+1.0}_{-0.5}$ V (p-p) 75 ohms, unbalanced, sync negative
Output	VIDEO OUT: BNC connector 1.0 V (p-p) ±0.1 V (p-p) 75 ohms, unbalanced, sync negative
Horizontal resolution	260 lines
Signal-to-noise ratio	Colour: Better than 40 dB B/W: Better than 43 dB

Audio

Input	AUDIO IN: phono jack 47 kilohms, −10 dBs (0 dBs = 0.775 V rms)
Output	AUDIO OUT: phono jack Load impedance less than 10 kilohms −10 dBs with 47 kilohms load, unbalanced
Frequency response	50 Hz to 10 kHz
Signal-to-noise ratio	40 dB
Audio distortion	Less than 4 % at 400 Hz

Tape transport

Tape speed	18.73 mm/sec.
Maximum recording time	2 hours 10 min. (with Sony L-500 cassette) 3 hours 15 min. (with L-750)
Fast forward/rewind time	Within 5 min. (with L-500)

– Continued on next page –

Beta
VIDEO CASSETTE RECORDER
SONY®

MICROFILM

Consumer VIDEO

Timer

Clock	Crystal lock
Time indication	24-hour cycle
Timer setting	Only for recording 4 events/3 weeks, adjustable for any day or for all 7 days of the week
Power back-up	Back-up duration of 3 minutes at one time

General

Power requirements	220 V AC ±10%, 50/60 Hz
Power consumption	38 W
Storage temperature	−20°C to +65°C (−4°F to +149°F)
Operating temperature	5°C to 40°C (41°F to 104°F)
Dimensions	Approx. 430 × 80 × 382 mm (w/h/d) ($17 \times 3\frac{1}{4} \times 15\frac{1}{8}$ inches) including projecting parts and controls
Weight	Approx. 8.3 kg (18 lbs 5 oz) net

Accessories supplied

75-ohm coaxial cable for recorder to TV connection (1)

Remote Commander RMT-231 with two IEC designation R6 batteries (1)

RF channel adjustment screwdriver (1)

Design and specifications subject to change without notice.

Note

Appliance conforms with EEC Directive 76/889 regarding interference suppression.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the B+ voltage to see it is at the values specified.

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

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REMOTE COMMANDER RMT-231 165

SECTION 1
GENERAL

1-1. PRECAUTIONS

On safety

- This unit operates on 220 V AC, 50/60 Hz.
- Should any solid object or liquid fall into the cabinet, turn off the unit and have it checked by qualified personnel before operating it any further.
- To disconnect the mains lead (ac power cord), pull it out by the plug. Never pull the lead itself.
- The unit is not disconnected from the mains (ac power source) as long as it is connected to the mains outlet, even if the unit itself has been turned off.

On installation

- Allow adequate air circulation to prevent internal heat build-up. Do not place the unit on surfaces (rugs, blankets, etc.) or near materials (curtains, draperies) that may block the ventilation grille.
- Do not install the unit near heat sources such as radiators or air ducts or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.
- The unit is designed for operation in a horizontal position. Do not install it in an inclined position.
- Keep the unit and cassette tapes away from equipment with strong magnets, such as a microwave oven, large loudspeakers, etc.

On operation

- When the unit is not to be used for a long period, turn the unit off to conserve energy and to extend the useful life of your unit.
- Remove and store video cassettes after recording or playback. Always store the cassette in its case to keep the tape away from dust.

On cleaning

Clean the cabinet, panel and controls with a dry soft cloth. Do not use a moistened cloth or any type of solvent, such as alcohol or benzine, which might damage the finish.

On repacking

Do not throw away the carton and packing materials. They make an ideal container in which to transport the unit. When shipping the unit to another location, repack it as illustrated on the carton.

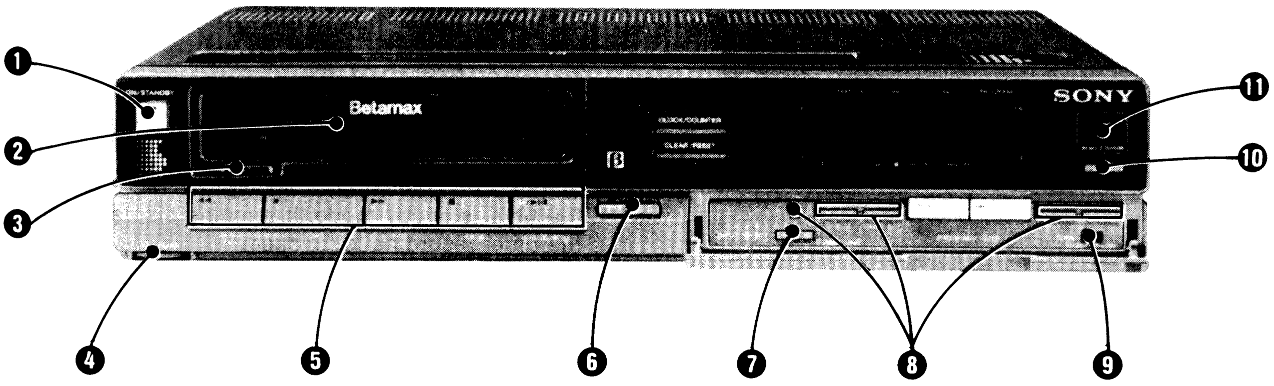
On colour broadcasting systems

This machine is designed to record and play back using the PAL and DDR SECAM colour systems. Recording and playback of video sources based on other colour systems cannot be guaranteed.

If you have any questions about this unit, contact your Sony dealer.

1-2. LOCATION AND FUNCTION OF CONTROLS

Front (panel opened)



❶ ON/STANDBY button and indicator
Press to turn on the unit. The indicator will light up. Press again to turn it off.
The timer section will continue to operate and the time will be displayed even if the ON/STANDBY button is off.

❷ Cassette compartment
Insert a cassette after turning on the recorder. The ▣ indication appears on the display window when a cassette is inside.

❸ ⏏ EJECT button
Press to remove the cassette. This button does not function when the recorder is turned off.

❹ TRACKING control
If streaks or snow appear during the playback of a tape recorded on another recorder, turn this knob to obtain the best possible picture.

❺ Function buttons

◀◀ REW button : Press to rewind the tape. Also used for the reverse picture search, skip scan and auto play operation.

▶ PLAY button : Press to play the tape back. Also used for auto play operation.

▶▶ FF button : Press to advance the tape rapidly. Also used for the forward picture search and skip scan operation.

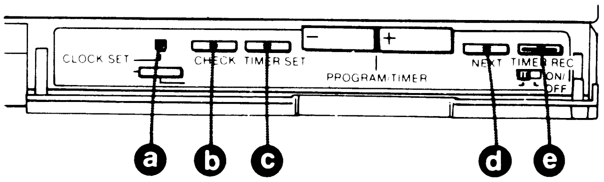
■ STOP button : Press to stop the tape.

II/▶◀ PAUSE/STILL button : Press to stop the tape for a moment during recording or playback. A still picture without noise will be seen during playback. Press again to release the pause mode.

❻ ●RECORD button
Press to start recording.

❼ INPUT SELECT button
Press to select the programme to be recorded.
LINE: for recording signals connected to the VIDEO IN and AUDIO IN jacks.
TUNER: for recording TV programmes.

❽ Buttons for clock and timer setting

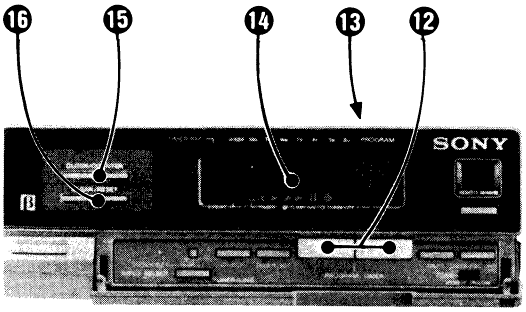


- ⓐ **CLOCK SET button:** Press to initiate clock setting.
- ⓑ **CHECK button:** Press to check timer settings.
- ⓒ **TIMER SET button:** Press to initiate setting of timer recording.
- ⓓ **NEXT button:** Press to advance to the next item to be set during clock or timer setting.
- ⓔ **TIMER REC ON/OFF button:** Press to activate timer recording. Press it again to deactivate timer recording or quick timer recording in timer standby mode or while recording.

❾ TONE selector
Normally, set to HIGH. If the high frequencies of playback sound seem exaggerated, set to LOW.

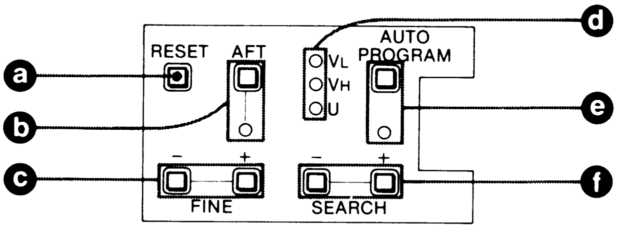
❿ QUICK TIMER button
Press to set the recording duration up to 4 hours in units of 30 minutes.

⓫ REMOTE SENSOR
Detects the remote control signal transmitted from the supplied Remote Commander.



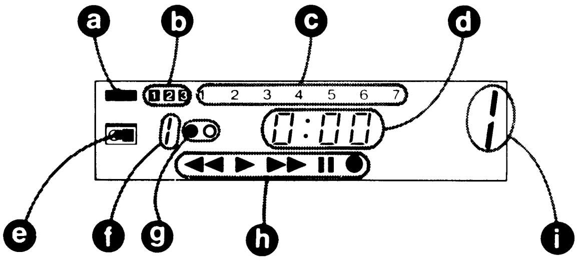
⑫ PROGRAM/TIMER +/– button
Press + to advance or – to reverse the programme numbers. Also used for clock setting and timer setting.

⑬ Tuning compartment
All the switches and buttons for programming stations are in this compartment.



- ⓐ **RESET button:** To clear the programmed station, press this button.
- ⓑ **AFT button and lamp:** The AFT circuit activates automatically after the stations are tuned and memorized with automatic and manual programming. The AFT lamp will illuminate. If you wish to restore the AFT on the channel which has been finetuned manually with the FINE buttons, press the AFT button.
- ⓒ **FINE + and – buttons:** Press to fine tune the station.
- ⓓ **Tuning indicator:** Indicates the tuning band.
- ⓔ **AUTO PROGRAM (automatic programming) button and lamp:** To preset the receivable stations automatically, press this button. The corresponding lamp blinks during automatic and manual programming.
- ⓕ **SEARCH + and – buttons:** Press to tune in a station. Press the – button to get a station of lower frequency and the + button to get a station of higher frequency.

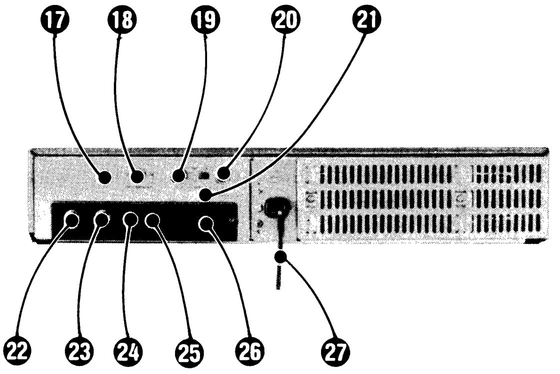
⑭ Display window



- ⓐ **TIMER REC indication:** Shows the recorder is in the timer standby mode. It remains displayed until the timer recording is finished.
- ⓑ **Week indications:** Show the week in which the timer recording will take place.
- ⓒ **Day of the week indications**
- ⓓ **Time and counter display:** Usually shows the present time.
  When the CLOCK/COUNTER button is pressed to COUNTER, the display shows the counter number.
- ⓔ **Cassette-inside indication:** Shows a cassette is inserted.
- ⓕ **Event number indication**
- ⓖ **Turn-on and turn-off setting indications:** The "●" mark shows the display is the turn-on time of the timer recording and the "O" mark shows the turn-off time.
- ⓗ **Tape operation mode indications:** Show the engaged tape operation mode: ◀◀ (rewind), ▶ (playback), ▶▶ (fast-forward), ❚❚ (pause) or ● (recording).
- ⓘ **Programme number:** Shows the programme number selected with the PROGRAM/TIMER + and – buttons.
  When the INPUT SELECT button is pressed to LINE to record signals from the VIDEO IN and AUDIO IN jacks, the indication will change to "AU".

⑮ CLOCK/COUNTER button
Press to set the display to the tape counter. To reset to clock, press it again.

⑯ CLEAR/RESET button
Press to set the tape counter reading to "0000" when the tape counter is displayed. Also used for changing the timer setting or erasing the memory of the timer setting.



⑰ RF CHANNEL screw
If there is interference on the factory-preset channel for RF output and the signal of this recorder cannot be displayed clearly on the TV screen, adjust this screw with the supplied screwdriver.

⑱ AERIAL OUT socket
Connect the aerial input of the TV receiver using the supplied cable.

⑲ DX/LOCAL switch
Normally set this switch to DX. If the TV signal is very strong, set the switch to LOCAL.

⑳ AERIAL IN socket
Connect the aerial cable.

㉑ TV VERT LOCK (TV vertical lock) control
Turn to stabilize the picture in still picture mode.

㉒ VIDEO OUT jack (BNC type)
Connect to the video input of another video cassette recorder or a video monitor.

㉓ VIDEO IN jack (BNC type)
Connect to the video output of a camera, another video cassette recorder, etc.

㉔ AUDIO OUT jack (phono type)
Connect to the audio input of a video monitor or video cassette recorder.

㉕ AUDIO IN jack (phono type)
Connect to the audio output of a camera or another video cassette recorder.

㉖ TEST SIGNAL switch
Set to ON to obtain the test pattern for adjusting the TV so that it can receive the signal from the recorder.

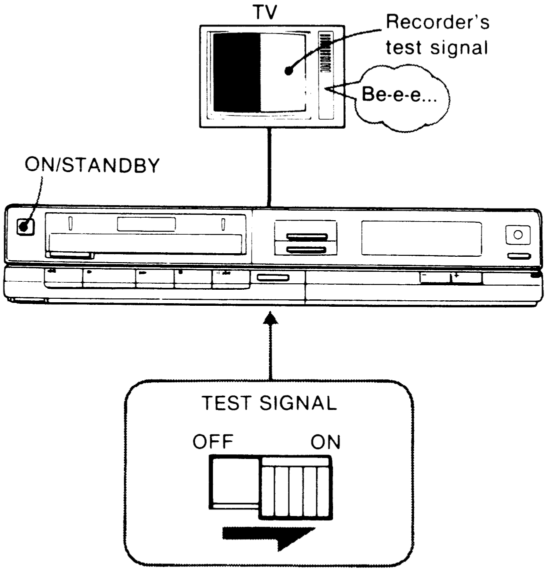
㉗ AC mains lead

1-3. ADJUSTING THE TV

One of the television programme positions must be adjusted to receive the signal from the recorder.
Note that the adjustment is not necessary, however, when the recorder is connected to the video/audio inputs on the TV receiver/monitor.

1 After making the connections, press the ON/STANDBY button.
2 Make sure that the recorder is in the stop mode.
3 Set the TEST SIGNAL switch located at the rear of the recorder to ON. The test signal is transmitted on a channel between UHF channels E30 and E39.
4 Turn on the TV and select a programme position which is not being used to receive a TV station. Tune the channel until you see a clear black and white pattern on the TV screen and you hear a continuous tone. This is the recorder's test signal.

—If you are not sure how to adjust your TV, please refer to the TV's instruction manual or consult your dealer.

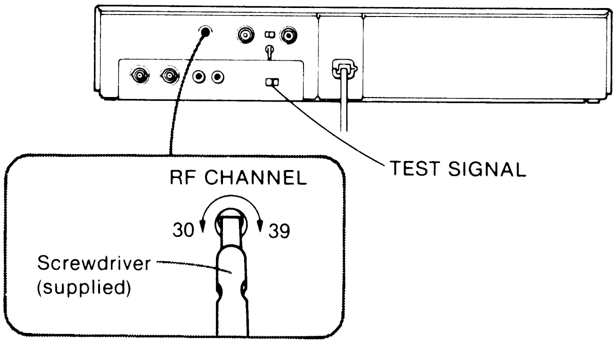


Whenever you use the video recorder, you should set the TV to the programme position selected in this adjustment.

If the test picture is free of disturbance, the TV adjustment is complete. Set the TEST SIGNAL switch to OFF.

If the test picture is not free of disturbance

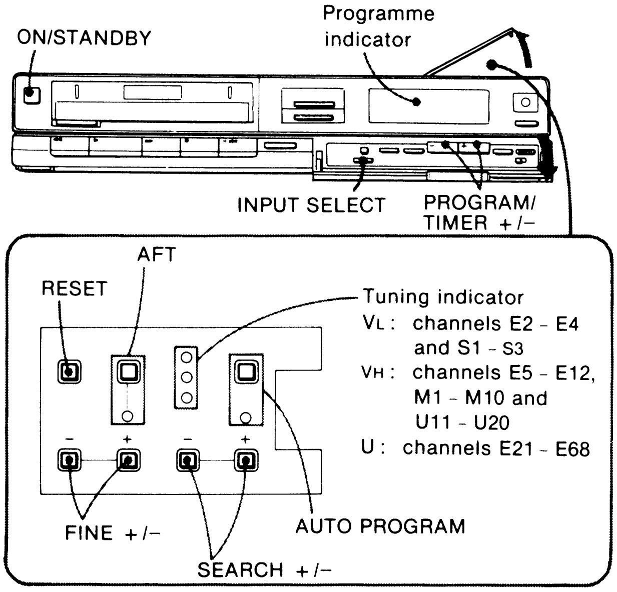
1 Reset the TEST SIGNAL switch to OFF.
2 Adjust the channel of the TV to a channel between UHF channels E30 and E39 with the tuning control or the fine tuning control on the TV, so that the TV screen shows no picture and so that a steady rustling sound or no sound is heard.
3 Set the TEST SIGNAL switch to ON again.
4 Slowly turn the RF CHANNEL screw on the back of the recorder with the supplied screwdriver, until you see an undistorted test pattern on the TV screen.
5 Now the TV adjustment is complete. Reset the TEST SIGNAL switch to OFF.



1-4. TV STATION PROGRAMMING

Automatic and manual programming are available. Automatic programming automatically presets up to 30 receivable stations from the lowest frequency to the highest. Manual programming is useful for presetting selected stations in any desired sequence.

To start programming, turn on the recorder by pressing the ON/STANDBY button and set the INPUT SELECT button to TUNER.



AUTOMATIC PROGRAMMING

Press the AUTO PROGRAM button. Up to 30 receivable stations will be preset one by one from programme position 1. When no more stations can be located, programme number "1" will light on the programme indicator and automatic programming will stop.

MANUAL PROGRAMMING

1 Press the + or – PROGRAM/TIMER button to select the programme position.
    + for a higher-numbered programme position
    – for a lower-numbered programme position

2 Press the + SEARCH button to locate a station with higher frequency and the – SEARCH button to locate a station with lower frequency. The tuning indicator will light to show the current tuning band. When a station has been received, the search will stop. Press the + or – SEARCH button again, until the desired station is received.

Repeat these steps for all desired stations.

FINE TUNING OF A WEAK STATION

If the picture on a particular programme position is not acceptable, keep the + or – FINE button pressed until the picture becomes clearer. When either of the FINE buttons is pressed, the AFT of the selected station is deactivated and the AFT lamp goes off. To view this particular station, keep the AFT deactivated. (Do not press the AFT button.)
When other memorized stations are selected, the AFT automatically activates.

ELIMINATING NOISE ON UNUSED PROGRAMME POSITIONS

Simply press the RESET button. The annoying noise will be eliminated.

1-5. CLOCK SETTING

When you connect the mains lead to a mains outlet, the clock indicates "0 : 00" with the two dots blinking.

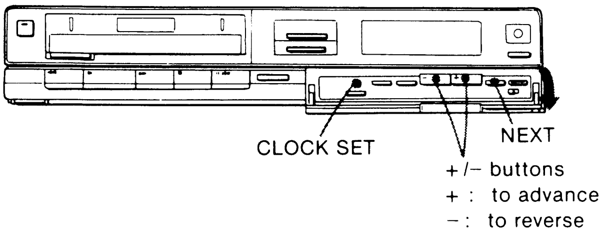
Example : To set the clock to 7 : 35 p.m. (19 : 35) on Tuesday *

***Time indication**

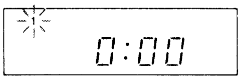
AM				PM					
12 : 00 (midnight)	1 : 00		11 : 00	12 : 00 (noon)	1 : 00	2 : 00		10 : 00	11 : 00
0:00	1:00		11:00	12:00	13:00	14:00		22:00	23:00

Day indication

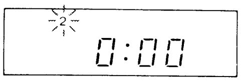
Mo (Monday)	Tu (Tuesday)	We (Wednesday)	Th (Thursday)	Fr (Friday)	Sa (Saturday)	Su (Sunday)
1	2	3	4	5	6	7



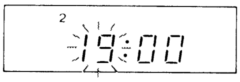
1 Press CLOCK SET.



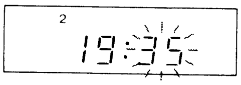
2 Set the day by pressing + or –.



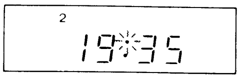
3 Press NEXT and set the hour by pressing + or –.



4 Press NEXT and set the minute by pressing + or –.



5 With an announced time signal, press NEXT.
The clock now starts operating, showing the correct time.



The dots of the colon alternately blink every 30 seconds.

NEXT button
Each time the NEXT button is pressed, the item to be set blinks to let you know the setting order.

+/– buttons
The + and – PROGRAM/TIMER buttons can be pressed in two ways.

When you hold a button down, the digits will advance continuously until the button is released.

When you press and immediately release a button, the digits will advance by one.

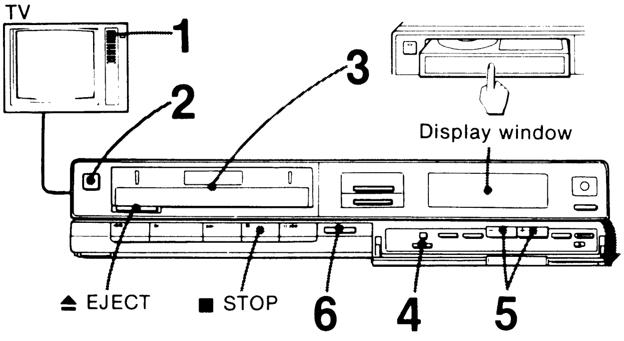
To change the actual clock setting
Press the CLOCK SET button and repeat the clock setting procedure from step 1.

Note
If you have pressed the CLOCK SET button inadvertently, press the NEXT button enough times until the dots of the colon blink.

When power has been interrupted for more than 3 minutes, the time indication "0:00" blinks, showing that the clock must be reset.
If power has been interrupted for less than 3 minutes, the displayed time remains correct.

1-6. TV PROGRAMME RECORDING

Numbers in the illustration show the sequence of operation.



1 Turn on the TV and select the programme position for the recorder.
2 Press the ON/STANDBY button. The indicator on the button will light up.
3 Insert the cassette with the round window to the left. The ⊡ indication will appear on the display window.
  ●Do not use force when inserting the cassette into the compartment.
4 Press the INPUT SELECT button (TUNER) so that a programme number appears on the display window.
5 Select the programme to be recorded with the +/− PROGRAM/TIMER buttons.
  + for higher numbered programmes, and − for lower numbered programmes.
6 Press the ● RECORD button. The ● indication will appear on the display window and recording will begin.
  ●If the inserted cassette does not have the safety tab, or if the tape is at its end, the cassette will be automatically ejected.

To stop recording, press the ■ STOP button.

To eject the cassette, press the ⏏ EJECT button after stopping the recording.

To view another programme while recording, simply select the programme you want to view with the TV's programme selector.

When the tape reaches the end during recording, it will be automatically rewound.

Note
The recorder can be automatically turned on by inserting a cassette without pressing the ON/STANDBY button.

CAUTION
Television programmes, films, video tapes and other materials may be copyrighted.
Unauthorized recording of such material may be contrary to the provision of the copyright laws.

TO STOP RECORDING MOMENTARILY

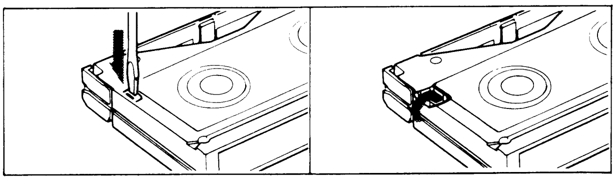
Press the ❚❚/▶|◀ button. The ❚❚ indicator will appear on the display window. The TV programme can be seen on the TV, but the picture will not be recorded.
To resume recording, press the ❚❚/▶|◀ button again.
To protect the video heads and the tape, the pause mode will be automatically released after about 8 minutes and recording will stop.

TO KEEP A RECORDED PROGRAMME FROM BEING ACCIDENTALLY ERASED

When a new recording is made on a previously recorded cassette, the previous recording will be automatically erased.

To avoid erasing a recording
Break off the safety tab using a screwdriver or similar object.

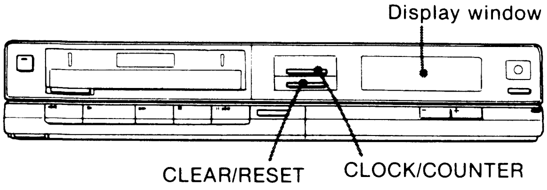
To re-record on a cassette which has had the safety tab removed
Cover the slot with a piece of plastic tape.



If you activate the ● RECORD button or the TIMER REC ON/OFF button with a cassette with its safety tab removed inserted, the cassette will be automatically ejected.

TO INDEX A RECORDED PROGRAMME USING THE TAPE COUNTER

Turn on the recorder and press the CLOCK/COUNTER button to display the counter reading in the display window.
To return the display to the present time, press the CLOCK/COUNTER button again.



Before starting recording or playback, press the CLEAR/RESET button to set the counter to "0000".
By noting the counter reading at the desired point, you can easily find that point later by referring to the counter.

Notes

- The counter reading is automatically reset to zero when a cassette is newly inserted.
- While the recorder is off, the display shows the present time, regardless of the CLOCK/COUNTER button setting.
- The counter reading will be retained in the memory even after the recorder is turned off, as long as the cassette is in the cassette compartment.
- The tape counter does not operate when a blank, unrecorded tape is played.

AUTOMATIC STOP

When the tape counter is displayed, rewinding stops at the tape counter's "0000" position. To rewind the tape further, press the ◀◀ button again.
When the current time is displayed, rewinding stops at the beginning of the tape.

1-7. TIMER-ACTIVATED RECORDING

Using the built-in timer, you can make four recordings any day or every day, either this week, next week or the week after next.

Possible days for recording

The day you set the timer

Mo	Tu	We	Th	Fr	Sa	Su	
			1	2	3	4	
5	6	7	8	9	10	11	This week 1
12	13	14	15	16	17	18	Next week 2
19	20	21	22	23	24	25	The week after next 3
26	27	28	29	30			

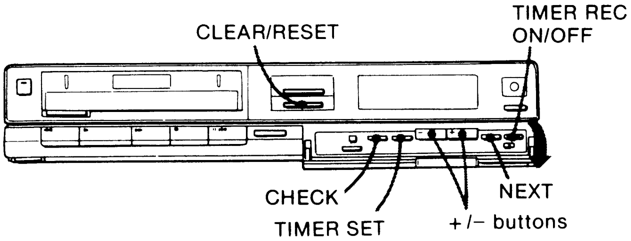
Check before setting the timer

- Is the clock set to the correct day and correct time? Timer setting can only be made after the clock has been set.
- Is a cassette inserted in the recorder?
- Is the cassette long enough to record the programmes?
- Does the cassette have a safety tab on the bottom?

Note: The timer cannot be set during recording or playback.

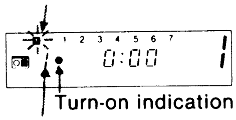
TO SET THE TIMER

Example: To record a PROGRAM 2 broadcast from 9:00 AM to 11:25 AM on Friday next week.



1 Press TIMER SET. (If the recorder is off, it will be turned on automatically.) An empty event number for which no timer setting has been made will appear.

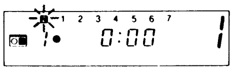
Week indication



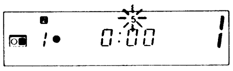
Turn-on indication

Event number

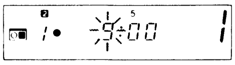
2 Set the week by pressing + or –. Week indication changes: 1→2→3



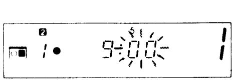
3 Press NEXT and set the turn-on day by pressing + or –. Day indication changes: 1234567(everyday)→ 1 → 2 →...7



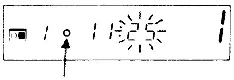
4 Pess NEXT and set the turn-on hour by pressing + or –.



5 Press NEXT and set the minute by pressing + or –. (To set to 00 minutes, there is no need to press + or –.)

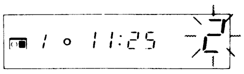


6 Press NEXT and set the turn-off hour and minute with + or – as in turn-on time setting.

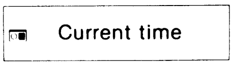


Turn-off indication

7 Press NEXT and select the programme to be recorded with + or –. To record the signals from the equipment connected to the VIDEO IN and AUDIO IN jacks, press INPUT SELECT so that "AU" indication appears.



8 Press NEXT. The display reverts to the current time.

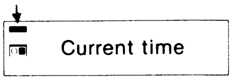


To set more events, press TIMER SET again to display the next event number. Repeat steps 2 to 8 above.

---

9 Press TIMER REC ON/OFF. The TIMER REC indication appears and the recorder is turned off.

TIMER REC indication



At the preset turn-on time, recording will start automatically and will stop at the preset turn-off time.

Note

If the inserted cassette is at its end or does not have the safety tab, the cassette will be automatically ejected when the TIMER REC ON/OFF button is pressed.

ONCE THE TIMER REC INDICATION HAS DISPLAYED, NO FUNCTION OF THE RECORDER CAN BE ACTIVATED, except for checking the timer setting.

To operate the recorder after setting the timer for recording, press the TIMER REC ON/OFF buton so that the TIMER REC indication goes off. To reactivate the timer recording standby mode, be sure to press the TIMER REC ON/OFF button again.

WHILE SETTING TIMER

To change the preset item
Press the CLEAR/RESET button and repeat the timer setting procedure from step 2.

To record to the end of the tape
Set the turn-off time to a time after the tape will reach its end.

BEFORE OR DURING TIMER RECORDING

To check the timer settings
Press the CHECK button. Each time the CHECK button is pressed, the display will change to the preset turn-on time and the turn-off time from event 1 to 4, then the current time.
During actual timer recording, only the turn-off time of that event can be checked.

To change the settings of an event

1 Press the TIMER REC ON/OFF button so that the TIMER REC indication goes off.
2 Press the CHECK button enough times to display the event to be changed.
3 Press the CLEAR/RESET button.
4 Repeat the timer setting procedure on page 33 from step 2.

To erase the timer setting of an event

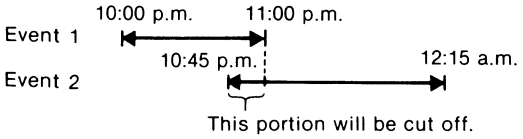
1 Press the TIMER REC ON/OFF button so that the TIMER REC indication goes off.
2 Press the CHECK button enough times to display the event to be erased.
3 Press the CLEAR/RESET button.
4 Press the TIMER SET button. The event will be erased from the memory.
5 If other events have been preset for recording, press the TIMER REC ON/OFF button again to reactivate.

Note: When the TIMER REC indication is displayed, the timer setting cannot be erased.

If the tape reaches the end during timer recording
The recording will stop and the tape will be rewound to the beginning. Then after about a second, the recorder will be turned off.

To stop the on-going timer recording
Press the TIMER REC ON/OFF button so that the TIMER REC indication goes off. The unit will be turned off automatically after about a second.

When two timer settings overlap
If two timer settings are preset as in the following example, the recording of the event 2 will begin after the first recording is completely finished. Consequently, the event 2 will be cut off in the beginning of its recording.



AFTER TIMER RECORDING

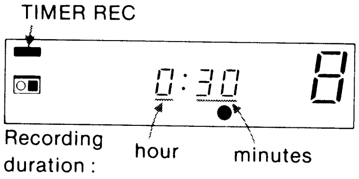
When a timer recording is finished, the setting (except the everyday setting) will be eliminated and the next timer settings will move up one event position each.
For example, if you have preset 4 events, when the first timer recording is finished, the fourth event position will be vacant. If the TIMER SET button is pressed, "4" will appear in the window.

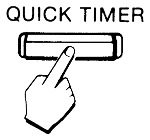
1-8. QUICK TIMER RECORDING

—To set the recording duration and to turn off the unit automatically

During recording, you can set the recording duration for up to 4 hours in units of 30 minutes by pressing the QUICK TIMER button. After the preset time has elapsed, recording stops and the recorder is turned off automatically.

1 Start recording.
2 Press the QUICK TIMER button to set the recording duration.
The TIMER REC indication will appear.





Each time you press the QUICK TIMER button, the indication changes :

0 : 30 → 1 : 00 → 1 : 30 → 2 : 00 → ... 3 : 30 → 4 : 00

As the recording continues, the duration indication decreases minute by minute to 0:00 and the recording stops. The recorder is turned off automatically.

Note
When the TIMER REC indication is displayed, no function of the recorder can be activated.

To extend the recording duration
The on-going recording duration can be extended simply by pressing the QUICK TIMER button.
The duration will be extended in units of 30 minutes with each pressing.
Example : When 2:25 is indicated,
2:25 → 2:30 → 3:00 ...

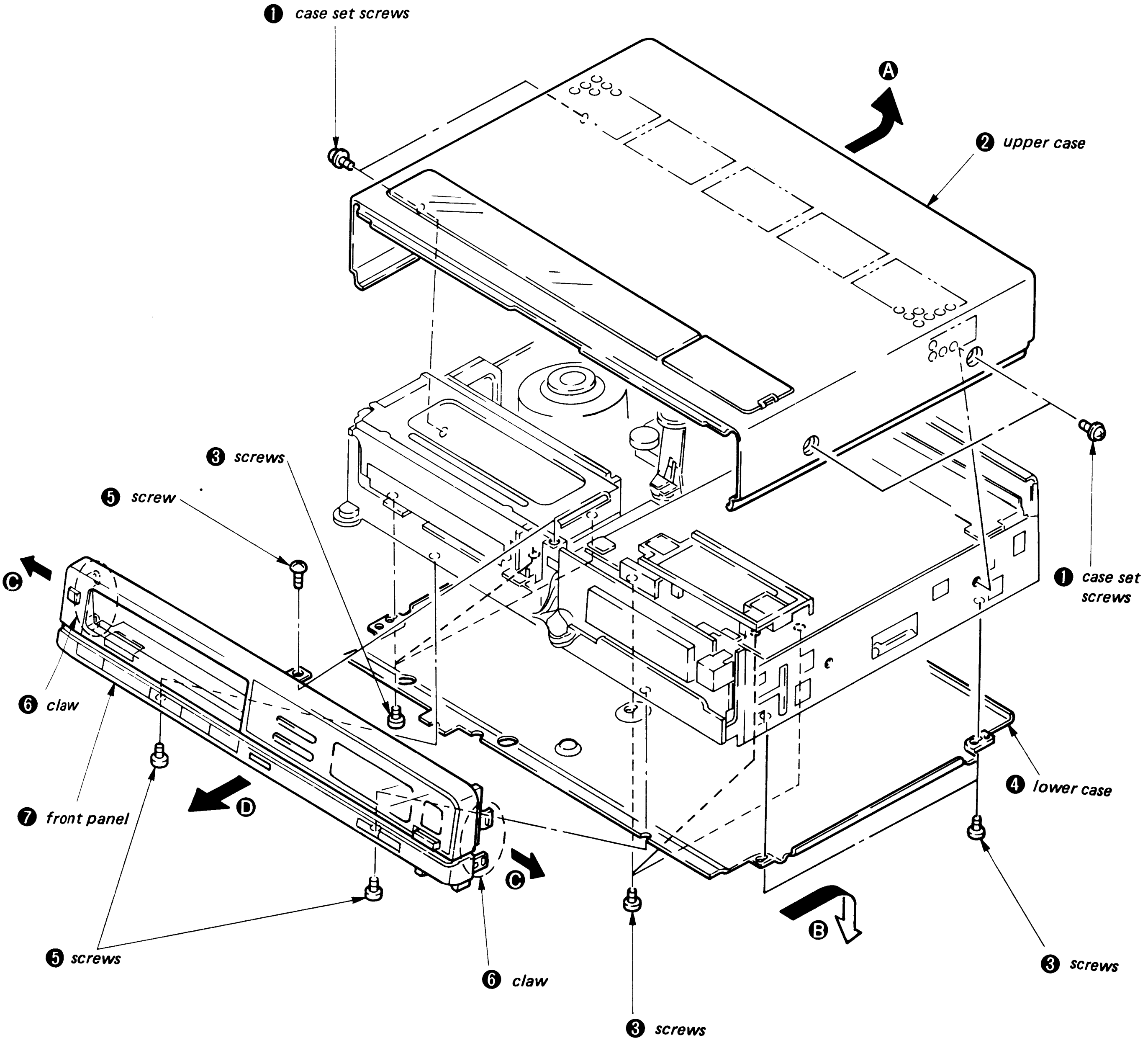
To cancel the quick timer function
Press the TIMER REC ON/OFF button so that the TIMER REC indication goes off. The recorder will be turned off automatically after about a second.

SECTION 2
DISASSEMBLY

2-1. DISASSEMBLY OF CABINET

1) Remove the four case set screws ❶ .
2) Remove the upper case ❷ in the direction shown by the arrow Ⓐ .
3) Loosen the eight screws (BVTP3 x 8) ❸ .
4) Remove the lower case ❹ in the direction shown by the arrow Ⓑ .
5) Remove the three screws (BVTP3 x 8) ❺ .
6) Remove the two claws ❻ in the direction shown by the arrow Ⓒ , then remove the front panel ❼ in the direction shown by the arrow Ⓓ .

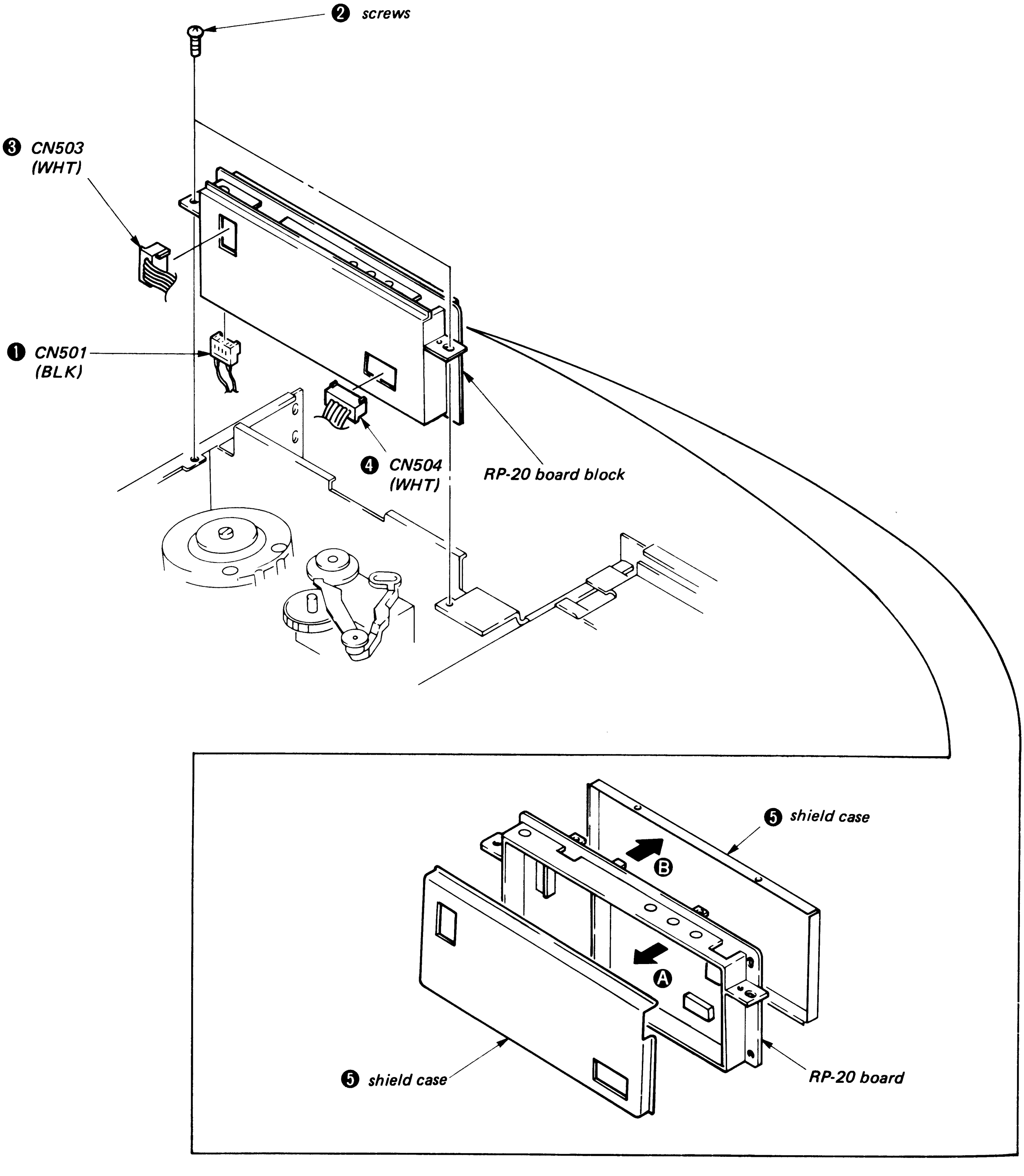
Note: Follow the disassembly procedure in the numerical order given.



❶ case set screws
Ⓐ
❷ upper case
❸ screws
❺ screw
Ⓒ
❶ case set screws
❻ claw
❹ lower case
❼ front panel
Ⓓ
Ⓒ
Ⓑ
❺ screws
❸ screws
❻ claw
❸ screws

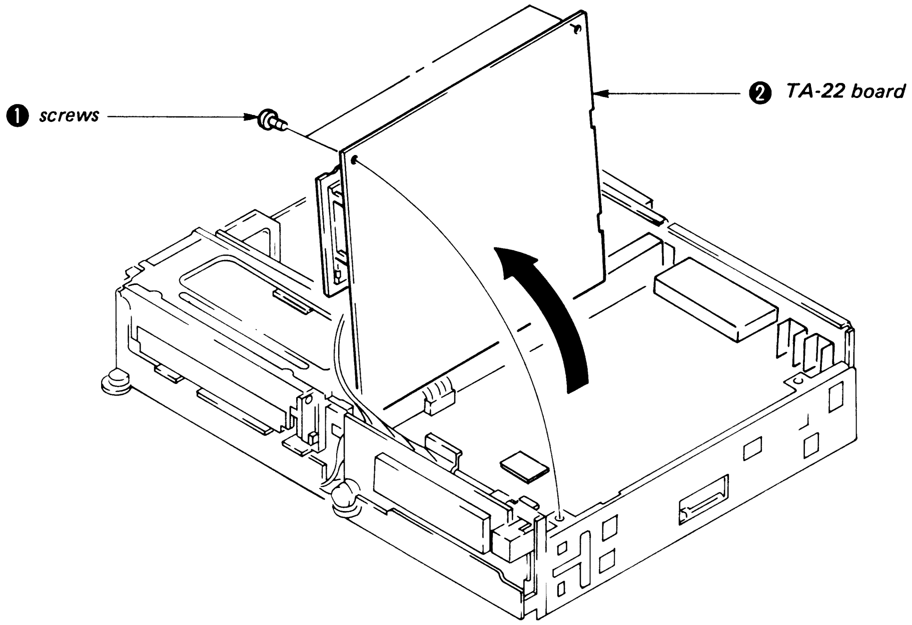
2-2. REMOVAL OF THE RP-20 BOARD

1) Pull out the connector CN501 ❶ .
2) Remove the two screws (BVTP3 x 8) ❷ .
3) Pull out the three connectors (CN503, CN504) ❸ , ❹ .
4) Remove the two shield cases ❺ in the direction shown by the arrows Ⓐ and Ⓑ .


❷ screws
❸ CN503 (WHT)
❶ CN501 (BLK)
❹ CN504 (WHT)
RP-20 board block
❺ shield case
Ⓑ
Ⓐ
❺ shield case
RP-20 board

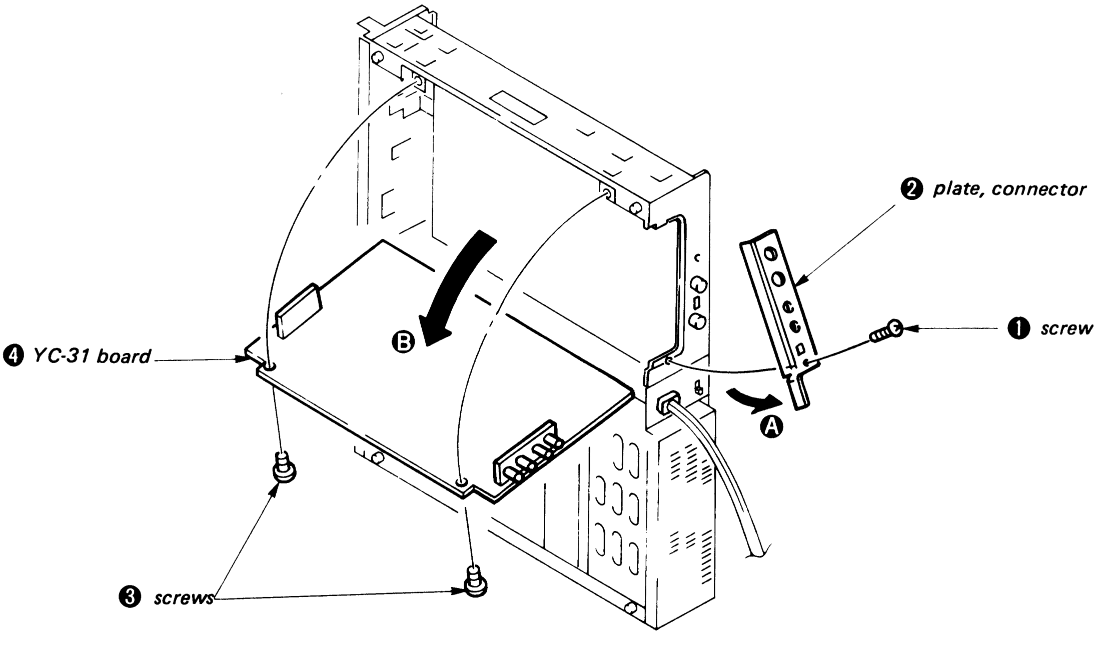
2-3. REMOVAL OF THE TA-22 BOARD

1) Remove the two screws (BVTP3 x 8) ❶ .
2) Remove the TA-22 board ❷ in the direction shown by the arrow.


❶ screws
❷ TA-22 board

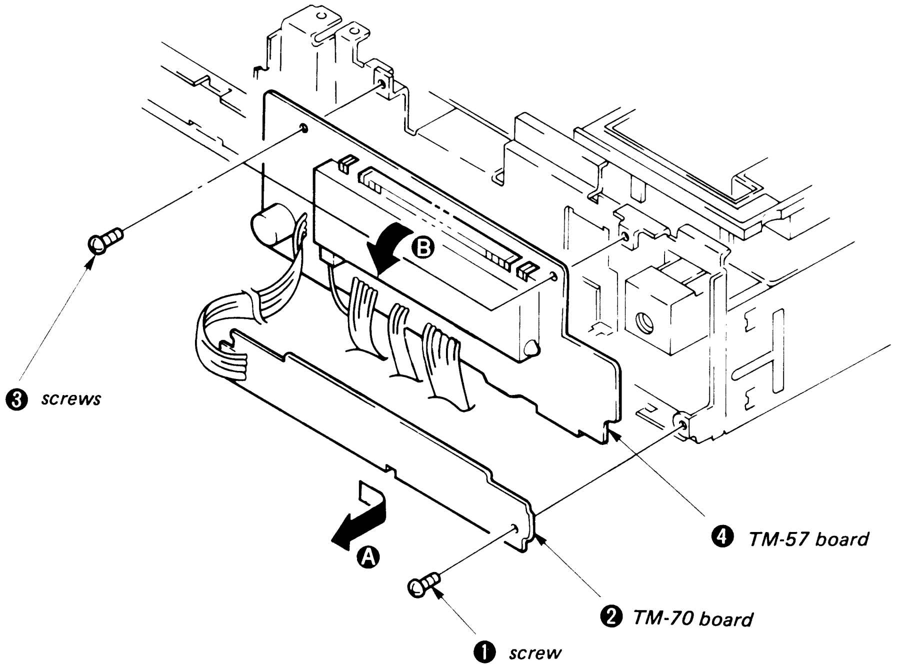
2-4. REMOVAL OF THE YC-31 BOARD

1) Stand the set with the left side panel on the bottom.
2) Remove the screw (BVTP3 x 8) ❶ .
3) Remove the plate, connector ❷ in the direction shown by the arrow Ⓐ .
4) Remove the two screws (BVTP3 x 8) ❸ .
5) Remove the YC-31 board ❹ in the direction shown by the arrow Ⓑ .


❷ plate, connector
❶ screw
❹ YC-31 board
Ⓑ
Ⓐ
❸ screws

2-5. REMOVAL OF THE TIMER BLOCK

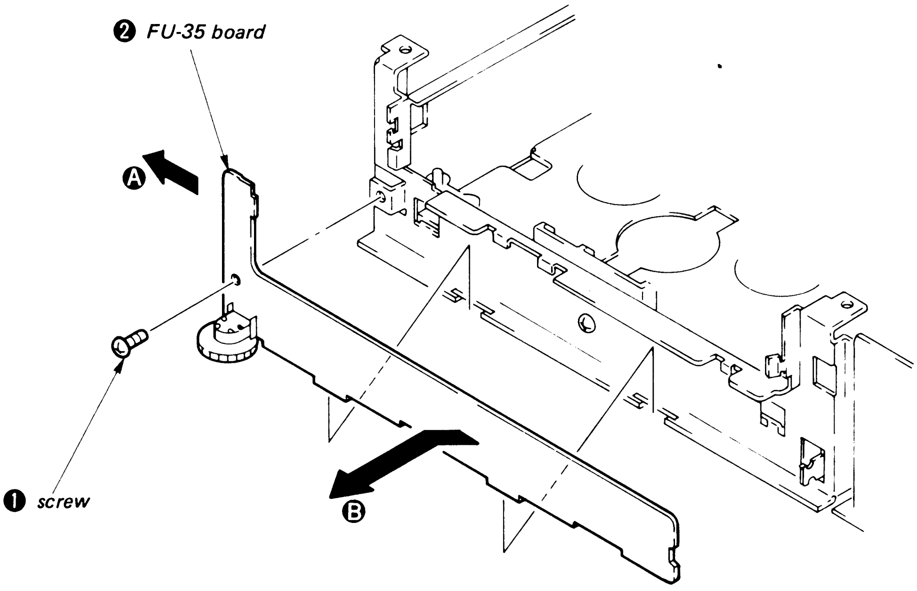
1) Remove the screw (BVTP3 x 8) ❶.
2) Remove the TM-70 board ❷ in the direction shown by the arrow Ⓐ.
3) Remove the two screws (BVTP3 x 8) ❸.
4) Remove the TM-57 board ❹ in the direction shown by the arrow Ⓑ.



Ⓑ
❸ screws
❹ TM-57 board
Ⓐ
❷ TM-70 board
❶ screw

2-6. REMOVAL OF THE FU-35 BOARD

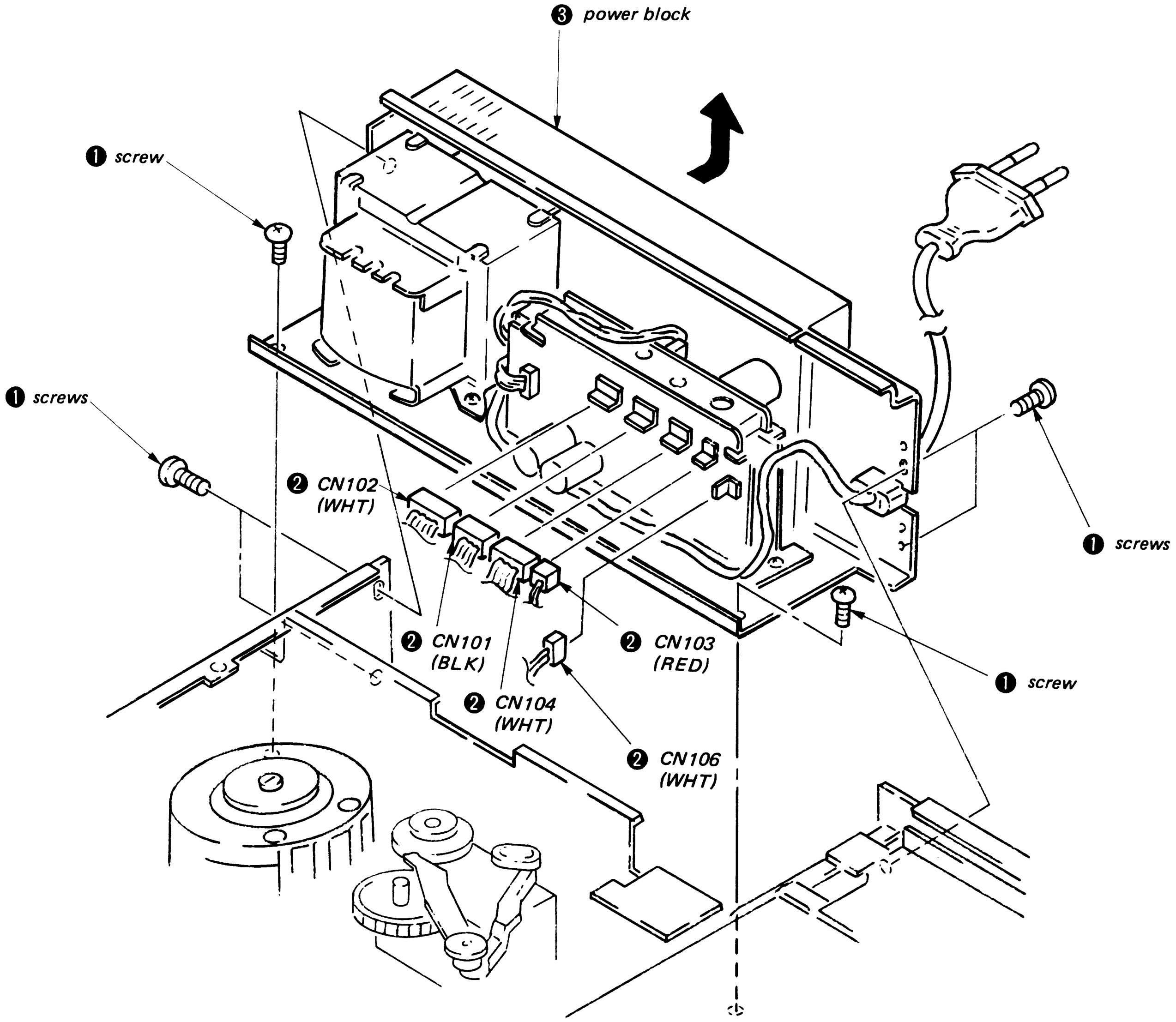
1) Remove the screw (BVTP3 x 8) ❶.
2) Remove the FU-35 board ❷ in the direction shown by the arrow Ⓐ, then remove in the direction shown by the arrow Ⓑ.



❷ FU-35 board
Ⓐ
❶ screw
Ⓑ

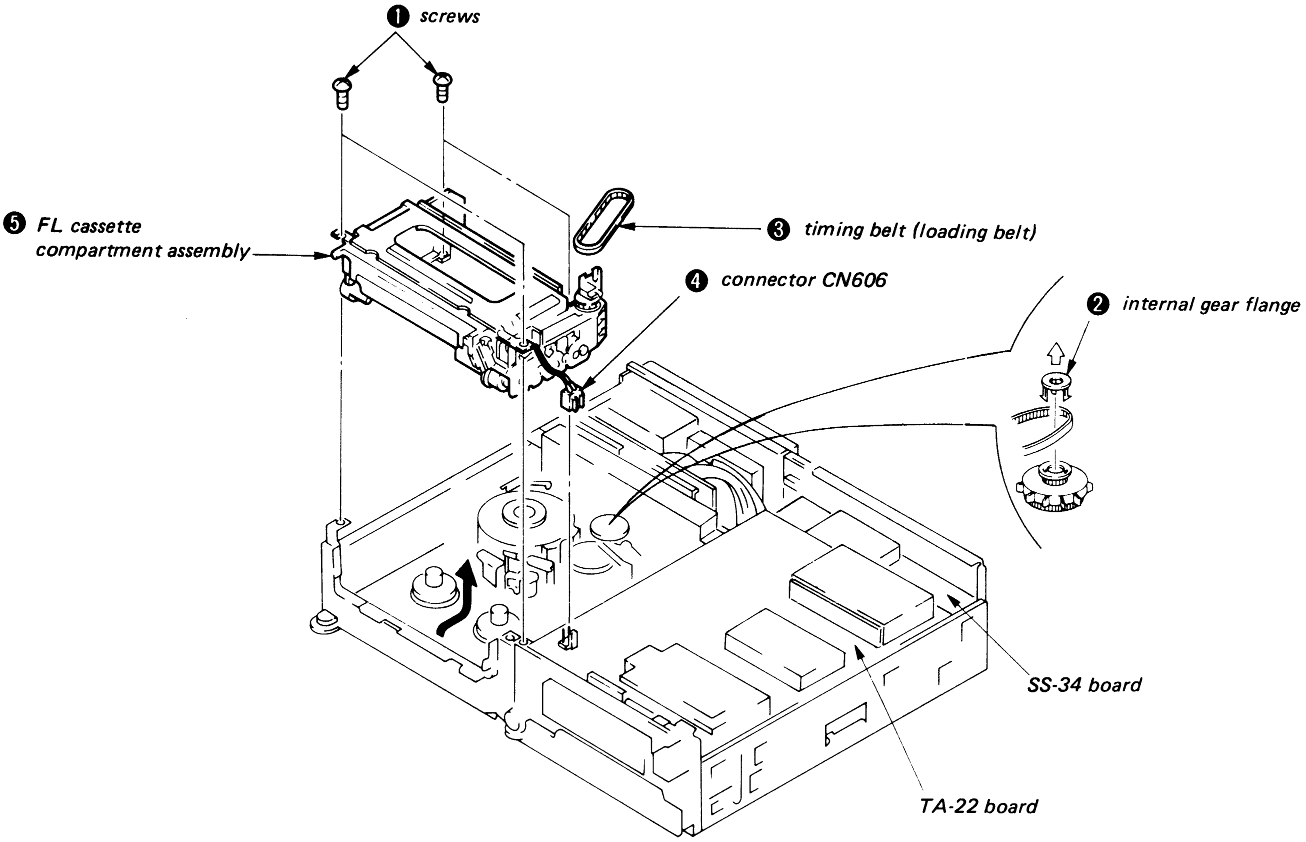
2-7. REMOVAL OF THE POWER BLOCK

1) Remove the six screws (BVTP3 x 8) ❶.
2) Pull out the five connectors (CN101, CN102, CN103, CN104, CN106) ❷.
3) Remove the power block ❸ in the direction shown by the arrow.


❸ power block
❶ screw
❶ screws
❷ CN102 (WHT)
❷ CN101 (BLK)
❷ CN104 (WHT)
❷ CN103 (RED)
❷ CN106 (WHT)
❶ screws
❶ screw

2-8. REMOVAL OF THE FL CASSETTE COMPARTMENT ASSEMBLY

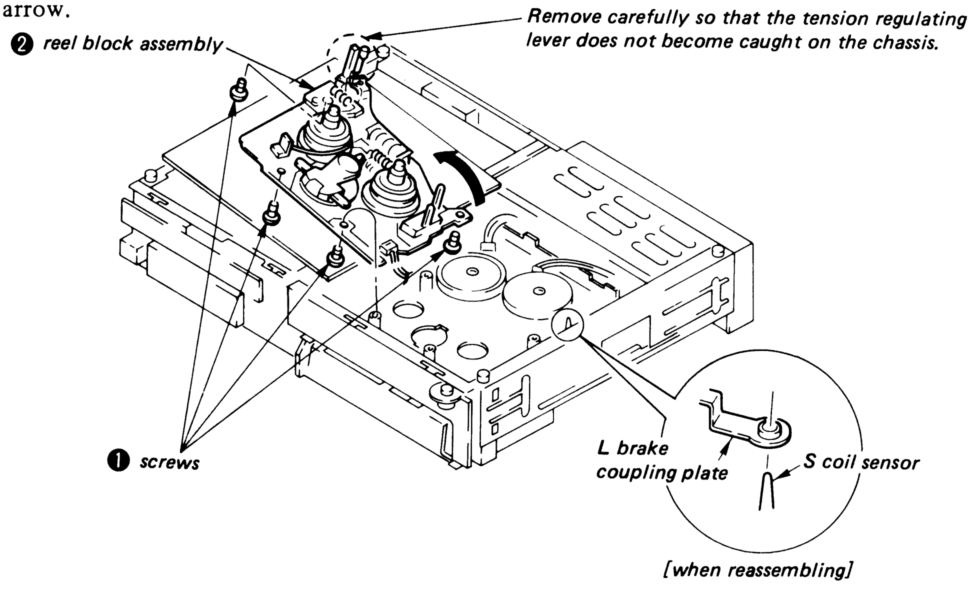
1) Remove the four screws (BVTP3 x 8) ❶ .
2) Remove the internal gear flange ❷ .
3) Remove the timing belt (loading belt) ❸ .
4) Pull out the connector CN606 ❹ , on the SS-34 board.
5) Remove the FL cassette compartment assembly ❺ in the direction shown by the arrow.



❶ screws
❺ FL cassette compartment assembly
❸ timing belt (loading belt)
❹ connector CN606
❷ internal gear flange
SS-34 board
TA-22 board

2-9. REMOVAL OF THE REEL BLOCK ASSEMBLY

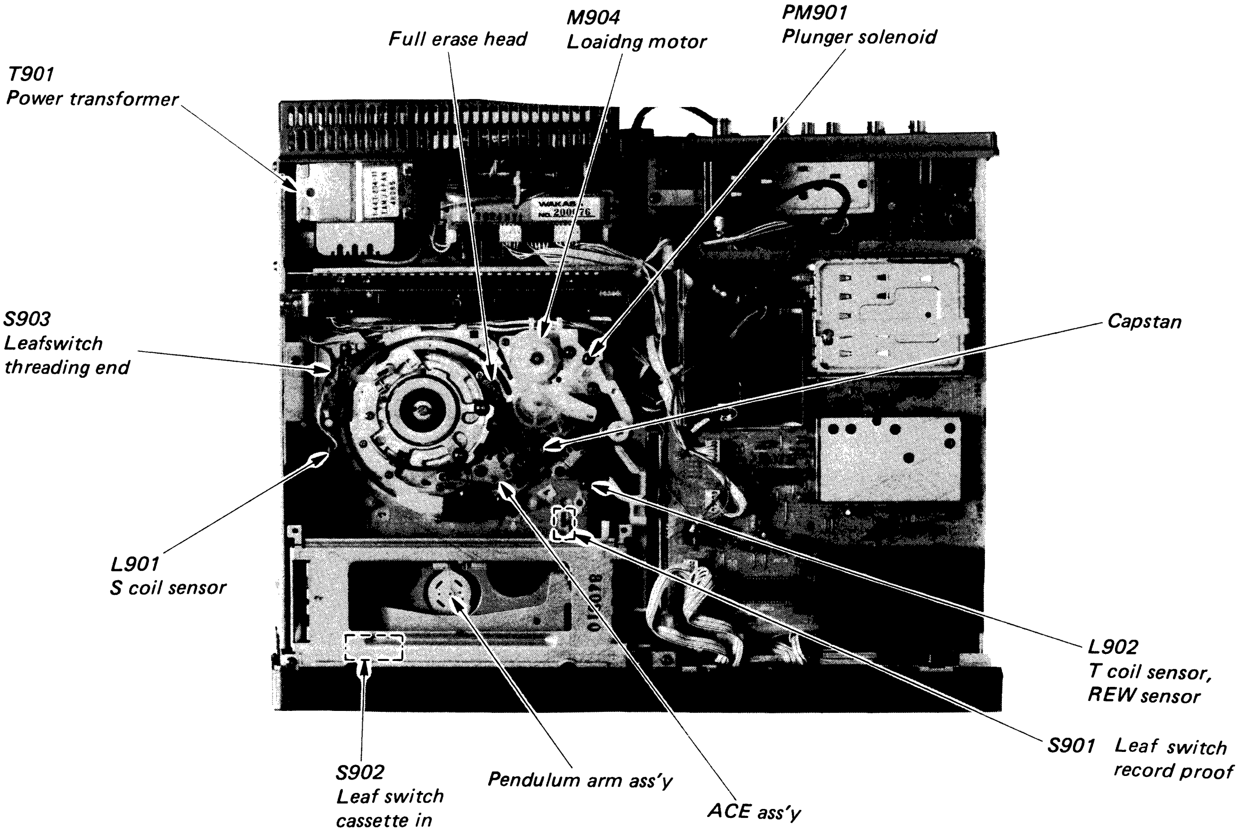
1) Remove the four screws (BVTP3 x 8) ❶ .
2) Remove the reel block assembly ❷ in the direction shown by the arrow.



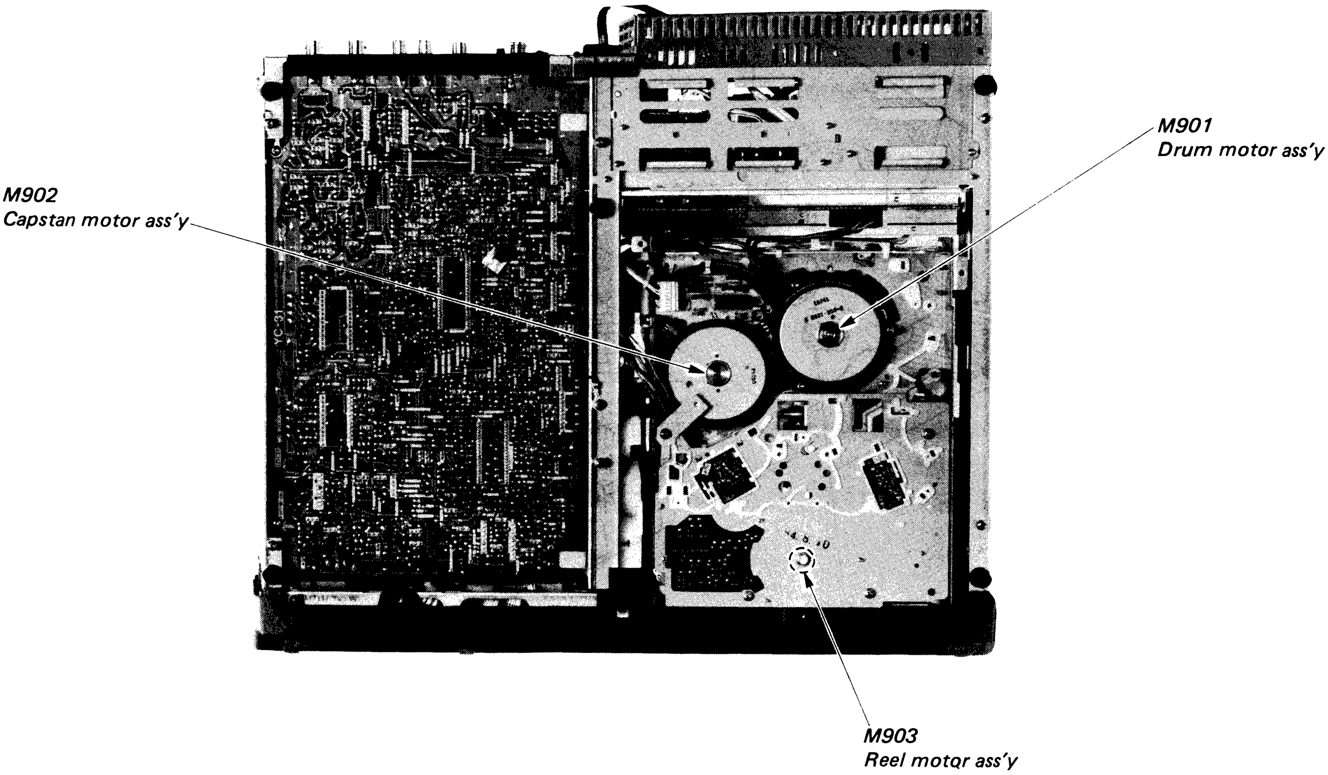
❷ reel block assembly
Remove carefully so that the tension regulating lever does not become caught on the chassis.
❶ screws
L brake coupling plate
S coil sensor
[when reassembling]

2-10. INTERNAL VIEW

– Top Side –

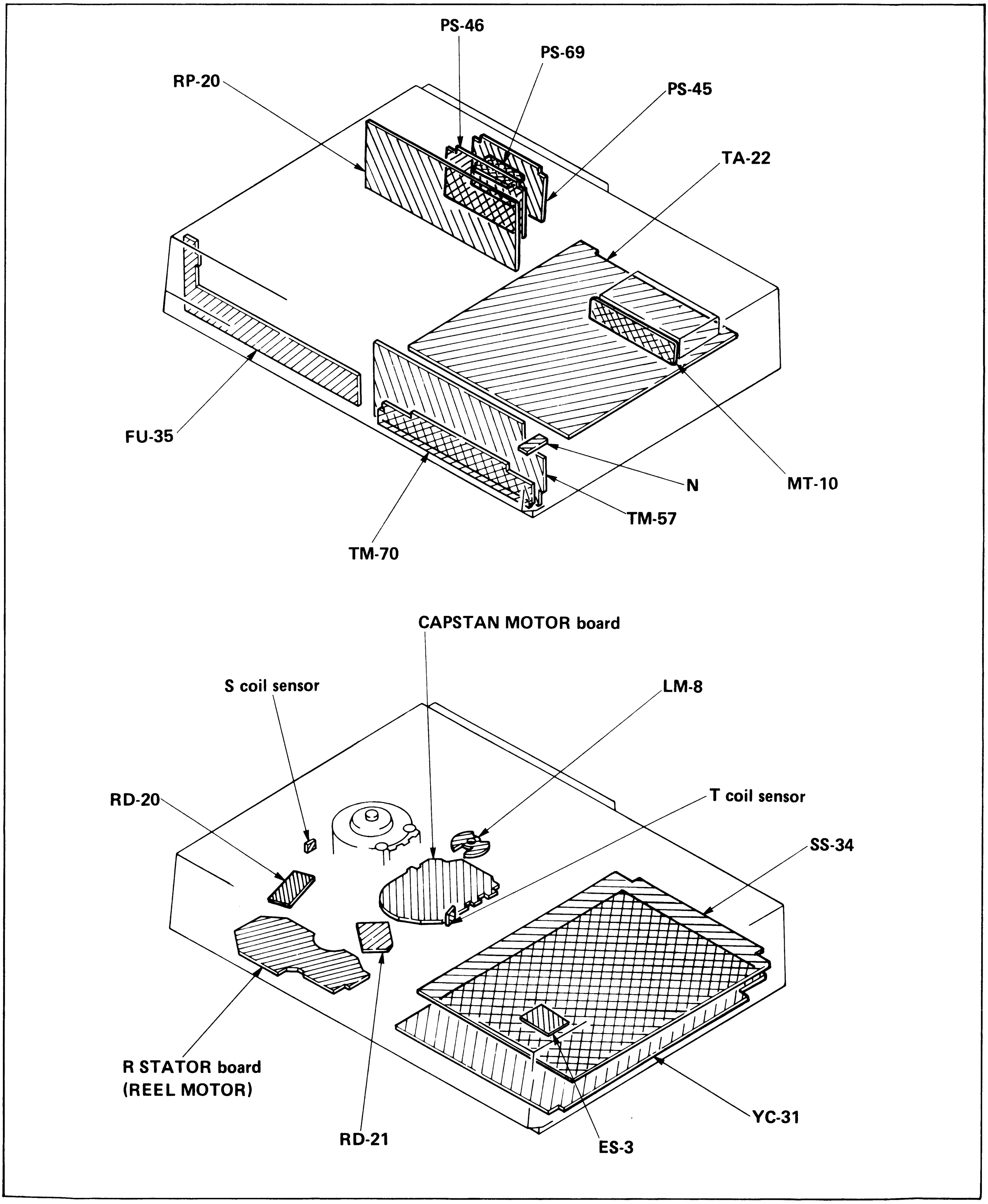

Full erase head
M904
Loaidng motor
PM901
Plunger solenoid
T901
Power transformer
S903
Leafswitch
threading end
Capstan
L901
S coil sensor
L902
T coil sensor,
REW sensor
S901 Leaf switch
record proof
S902
Leaf switch
cassette in
Pendulum arm ass'y
ACE ass'y

– Bottom Side –


M901
Drum motor ass'y
M902
Capstan motor ass'y
M903
Reel motor ass'y

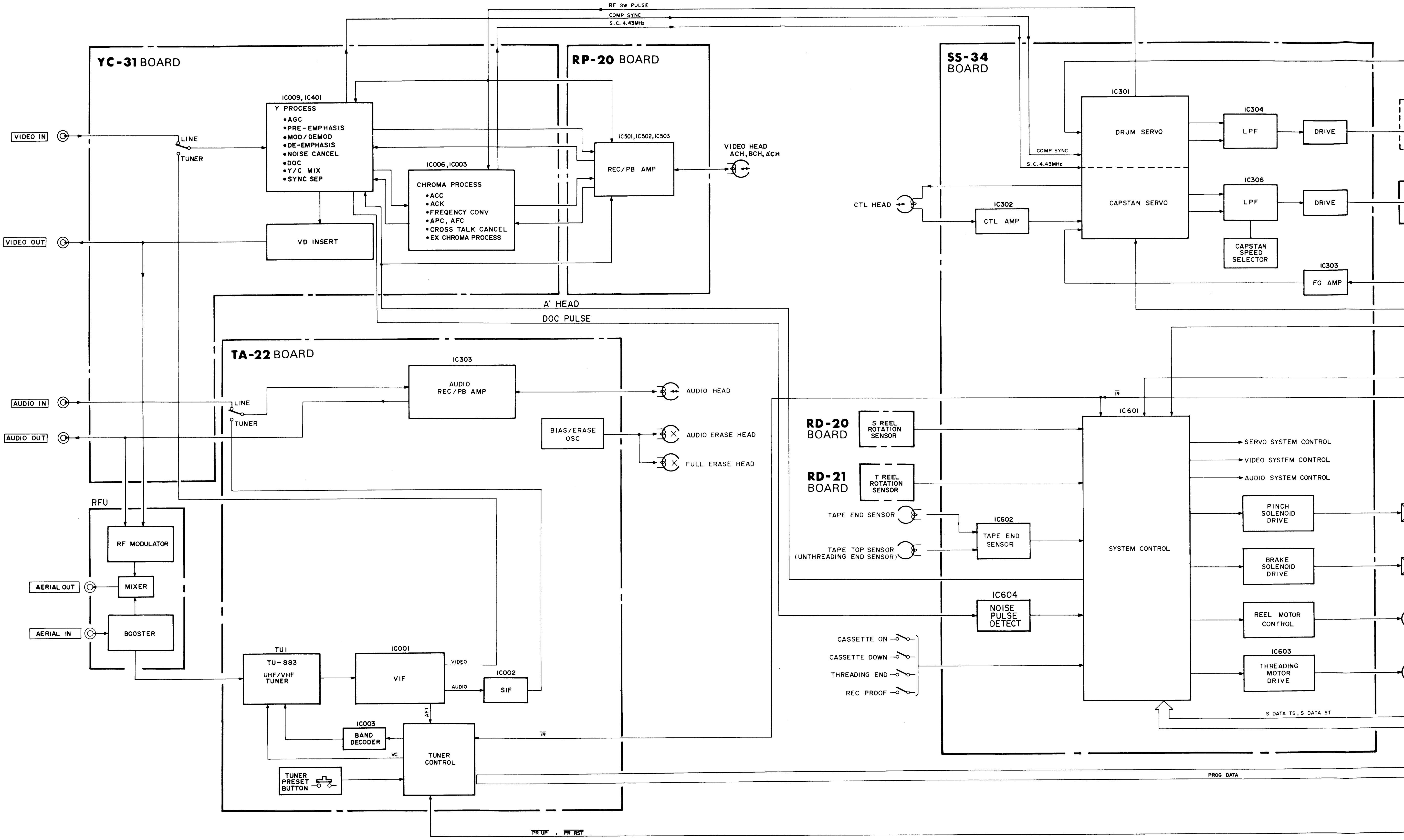
SECTION 3
DIAGRAMS

3-1. CIRCUIT BOARDS LOCATION

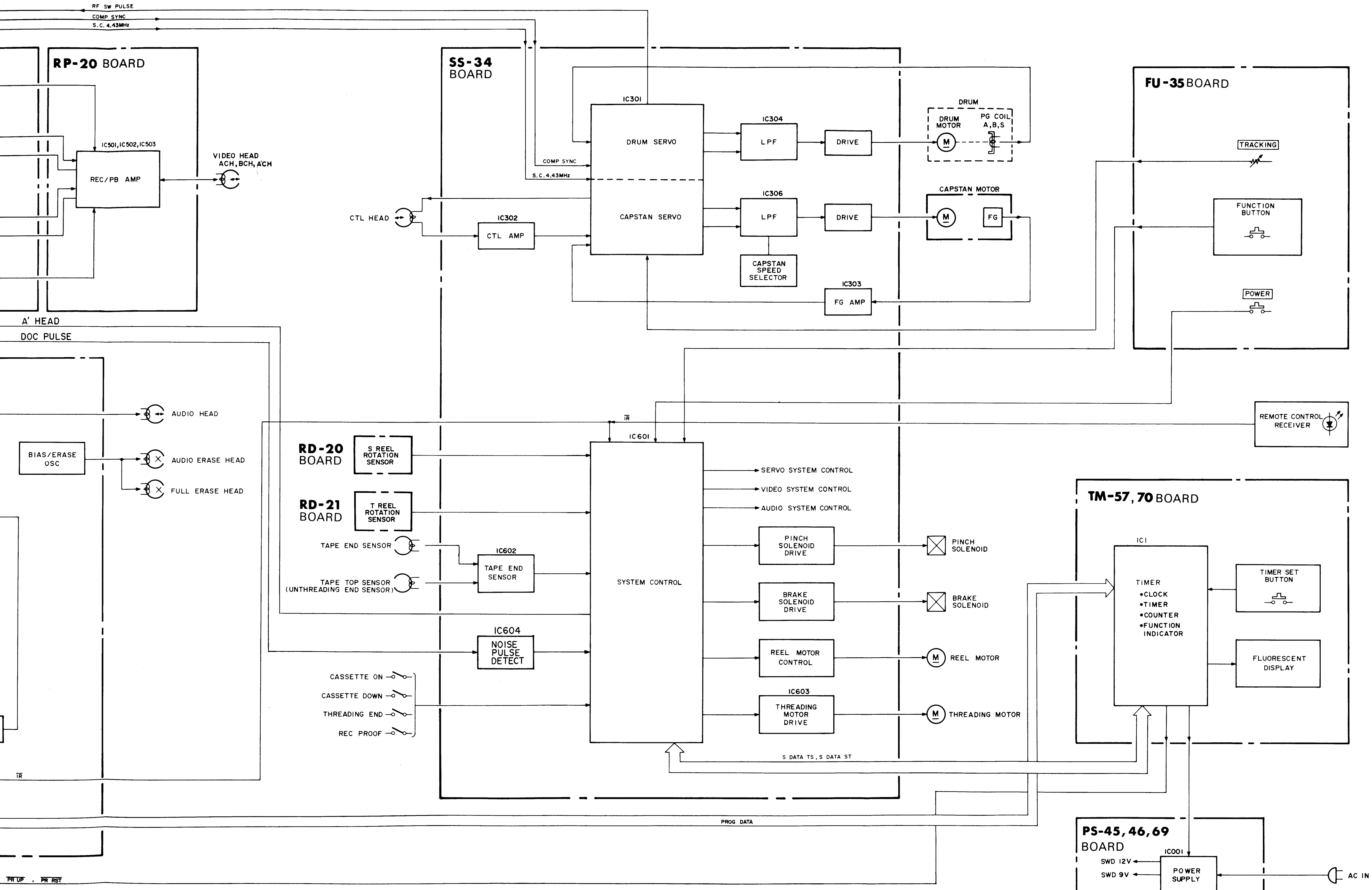

PS-46
PS-69
RP-20
PS-45
TA-22
FU-35
N
MT-10
TM-57
TM-70
CAPSTAN MOTOR board
S coil sensor
LM-8
RD-20
T coil sensor
SS-34
R STATOR board
(REEL MOTOR)
RD-21
ES-3
YC-31

Note: The ES-3 board is mounted on the SS-34 board.

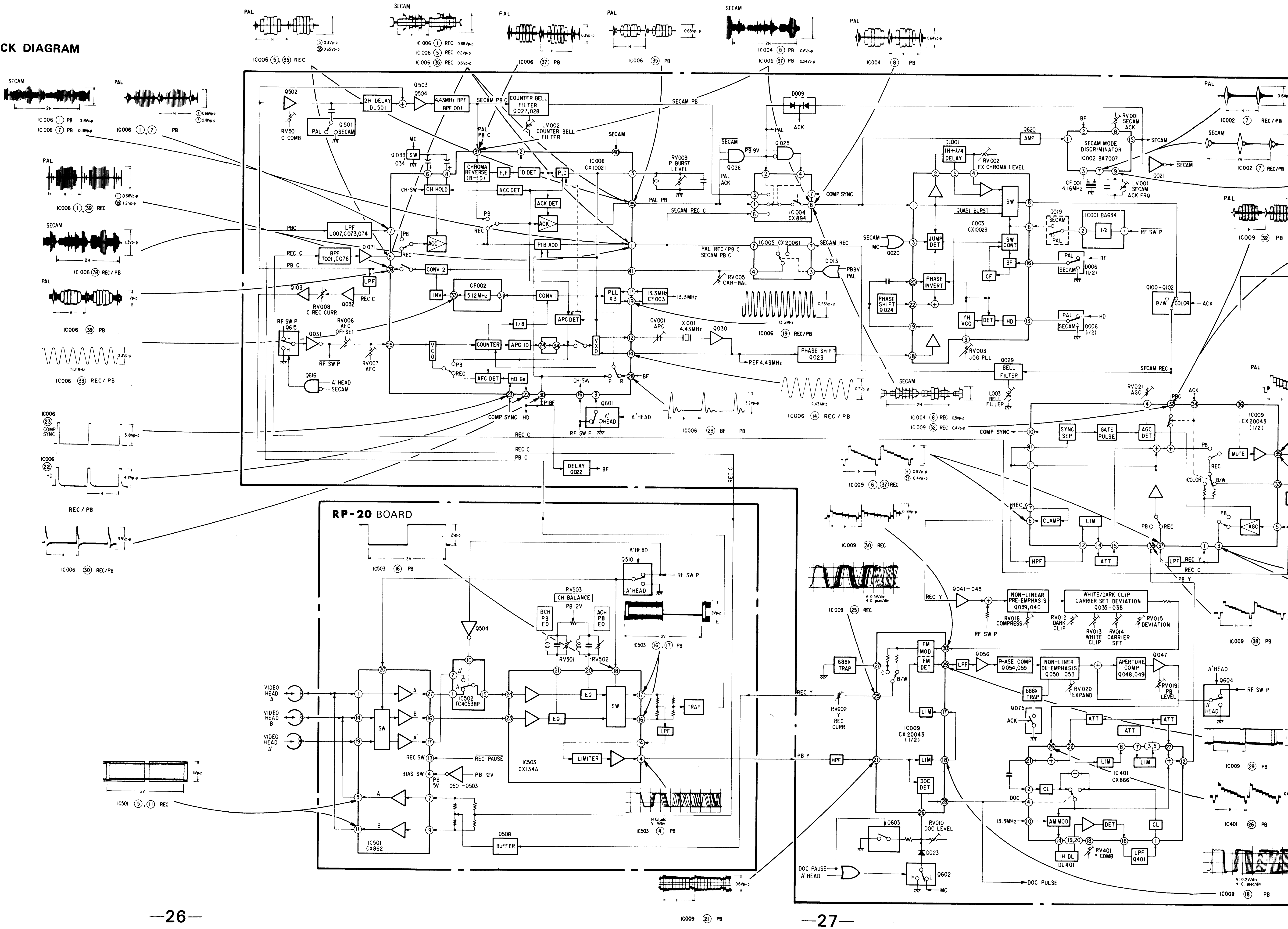
3-2. OVERALL BLOCK DIAGRAM

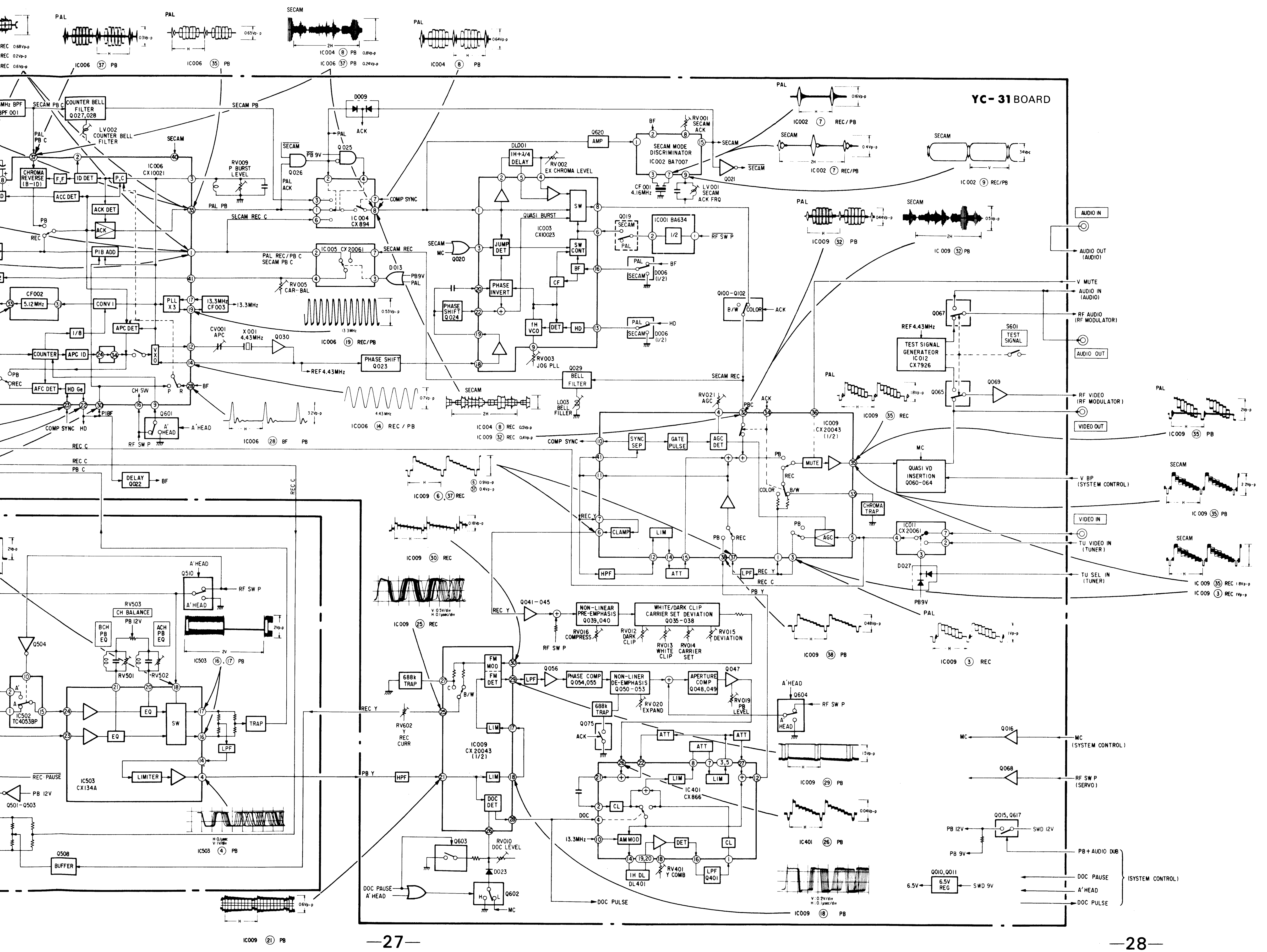


RF SW PULSE
COMP SYNC
S.C. 4.43MHz
YC-31 BOARD
IC009, IC401
Y PROCESS
•AGC
•PRE-EMPHASIS
•MOD/DEMOD
•DE-EMPHASIS
•NOISE CANCEL
•DOC
•Y/C MIX
•SYNC SEP
VIDEO IN
LINE
TUNER
IC006, IC003
CHROMA PROCESS
•ACC
•ACK
•FREQENCY CONV
•APC, AFC
•CROSS TALK CANCEL
•EX CHROMA PROCESS
VIDEO OUT
VD INSERT
RP-20 BOARD
IC501, IC502, IC503
REC/PB AMP
VIDEO HEAD
ACH, BCH, A'CH
A' HEAD
DOC PULSE
TA-22 BOARD
IC303
AUDIO
REC/PB AMP
AUDIO HEAD
AUDIO IN
LINE
TUNER
AUDIO OUT
BIAS/ERASE
OSC
AUDIO ERASE HEAD
FULL ERASE HEAD
RFU
RF MODULATOR
AERIAL OUT
MIXER
AERIAL IN
BOOSTER
TU1
TU-883
UHF/VHF
TUNER
IC001
VIF
VIDEO
AUDIO
IC002
SIF
AFT
IC003
BAND
DECODER
VC
TUNER
CONTROL
IR
TUNER
PRESET
BUTTON
PROG DATA
PR UP , PR RST
SS-34
BOARD
IC301
DRUM SERVO
CAPSTAN SERVO
COMP SYNC
S.C. 4.43MHz
IC304
LPF
DRIVE
IC306
LPF
DRIVE
CAPSTAN
SPEED
SELECTOR
IC303
FG AMP
CTL HEAD
IC302
CTL AMP
IR
IC601
SYSTEM CONTROL
RD-20
BOARD
S REEL
ROTATION
SENSOR
RD-21
BOARD
T REEL
ROTATION
SENSOR
TAPE END SENSOR
TAPE TOP SENSOR
(UNTHREADING END SENSOR)
IC602
TAPE END
SENSOR
IC604
NOISE
PULSE
DETECT
CASSETTE ON
CASSETTE DOWN
THREADING END
REC PROOF
SERVO SYSTEM CONTROL
VIDEO SYSTEM CONTROL
AUDIO SYSTEM CONTROL
PINCH
SOLENOID
DRIVE
BRAKE
SOLENOID
DRIVE
REEL MOTOR
CONTROL
IC603
THREADING
MOTOR
DRIVE
S DATA TS, S DATA ST

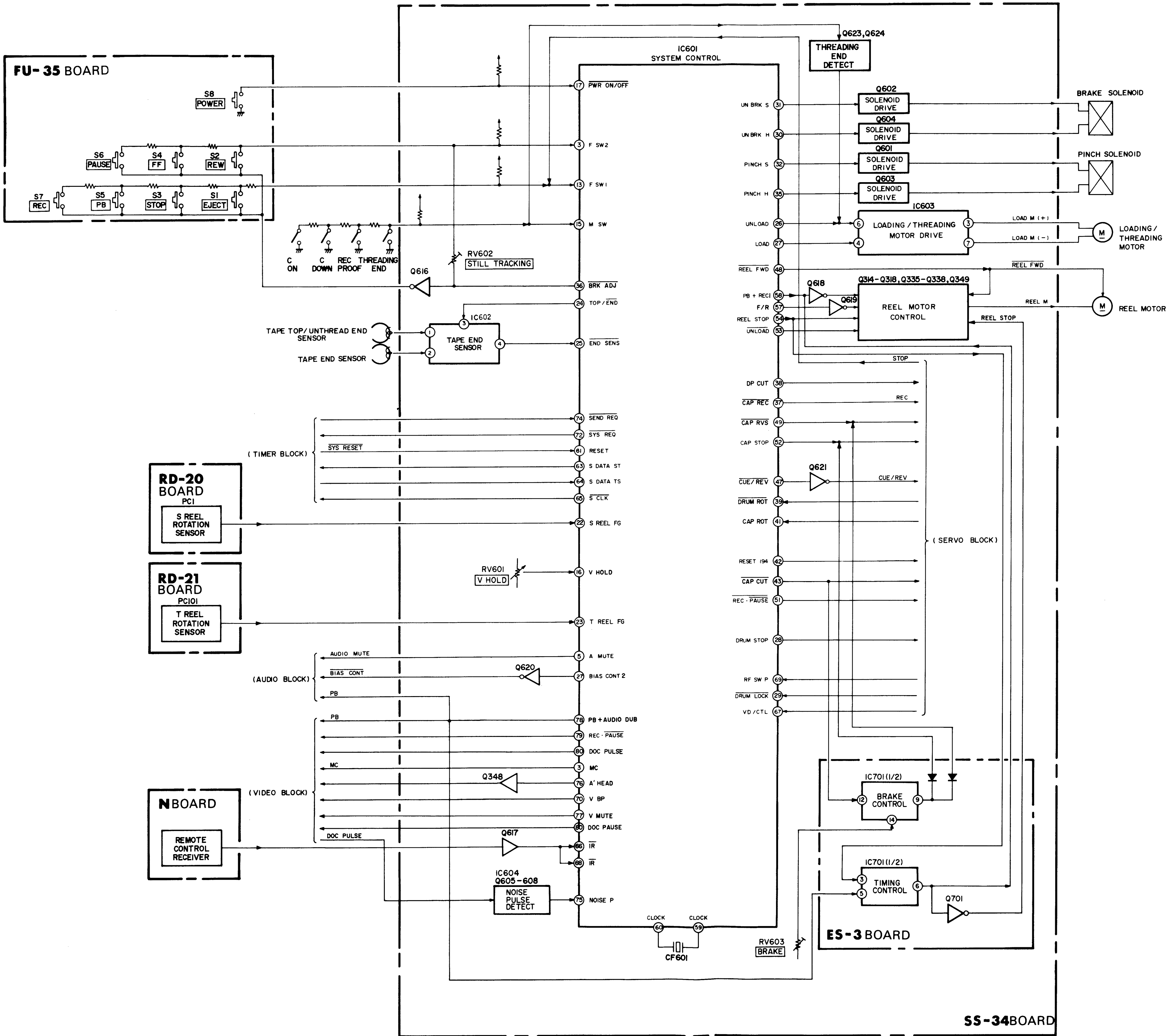

RF SW PULSE
COMP SYNC
S.C. 4.43MHz
RP-20 BOARD
IC501, IC502, IC503
REC/PB AMP
VIDEO HEAD ACH, BCH, A'CH
A' HEAD
DOC PULSE
AUDIO HEAD
BIAS/ERASE OSC
AUDIO ERASE HEAD
FULL ERASE HEAD
IR
PR UP , PR RST
SS-34 BOARD
IC301
DRUM SERVO
COMP SYNC
S.C. 4.43MHz
CAPSTAN SERVO
CTL HEAD
IC302
CTL AMP
IC304
LPF
DRIVE
IC306
LPF
DRIVE
CAPSTAN SPEED SELECTOR
IC303
FG AMP
DRUM
DRUM MOTOR
M
PG COIL A,B,S
CAPSTAN MOTOR
M
FG
FU-35 BOARD
TRACKING
FUNCTION BUTTON
POWER
REMOTE CONTROL RECEIVER
IR
IC601
SYSTEM CONTROL
RD-20 BOARD
S REEL ROTATION SENSOR
RD-21 BOARD
T REEL ROTATION SENSOR
TAPE END SENSOR
IC602
TAPE END SENSOR
TAPE TOP SENSOR (UNTHREADING END SENSOR)
IC604
NOISE PULSE DETECT
CASSETTE ON
CASSETTE DOWN
THREADING END
REC PROOF
SERVO SYSTEM CONTROL
VIDEO SYSTEM CONTROL
AUDIO SYSTEM CONTROL
PINCH SOLENOID DRIVE
PINCH SOLENOID
BRAKE SOLENOID DRIVE
BRAKE SOLENOID
REEL MOTOR CONTROL
M
REEL MOTOR
IC603
THREADING MOTOR DRIVE
M
THREADING MOTOR
S DATA TS, S DATA ST
PROG DATA
TM-57, 70 BOARD
IC1
TIMER
•CLOCK
•TIMER
•COUNTER
•FUNCTION INDICATOR
TIMER SET BUTTON
FLUORESCENT DISPLAY
PS-45, 46, 69 BOARD
IC001
SWD 12V
SWD 9V
POWER SUPPLY
AC IN

3-3. VIDEO BLOCK DIAGRAM


PAL
SECAM
IC006 ⑤, ㉟ REC
IC006 ① REC
IC006 ⑤ REC
IC006 ㉟ REC
IC006 ㊲ PB
IC006 ㉟ PB
IC004 ⑧ PB
IC006 ㊲ PB
IC006 ①, ⑦ PB
IC006 ①, ㊴ REC
IC006 ㊴ REC/PB
IC006 ㊴ PB
IC006 ㉝ REC/PB
IC006 ㉓ COMP SYNC
IC006 ㉒ HD
REC/PB
IC006 ㉚ REC/PB
Q502
RV501 C COMB
Q501 PAL SECAM
2H DELAY DL501
Q503
Q504
4.43MHz BPF BPF 001
SECAM PB C
COUNTER BELL FILTER Q027,028
LV002 COUNTER BELL FILTER
SECAM PB
D009
ACK
PAL
Q025
Q026
PB 9V
PAL ACK
IC004 CX894
COMP SYNC
RV009 P BURST LEVEL
PAL PB
SECAM REC C
IC006 CX10021
CHROMA REVERSE (B-ID)
F.F
ID DET
P.C
ACC DET
ACK DET
ACK
PIB ADD
CH HOLD
CH SW
ACC
MC
Q033 034
SW
LPF L007, C073, 074
PBC
REC C
PB C
BPF T001, C076
Q071
CONV 2
INV
CF002 5.12MHz
CONV 1
PLL X3
13.3MHz CF003
13.3MHz
Q103
RV008 C REC CURR
Q032
RF SW P Q615
Q031
RV006 AFC OFFSET
RV007 AFC
Q616
A' HEAD
SECAM
VCO
COUNTER
APC ID
APC DET
1/8
VXO
AFC DET
HD Ge
CV001 APC
X001 4.43MHz
Q030
REF 4.43MHz
PHASE SHIFT Q023
Q601
A' HEAD
RF SW P
COMP SYNC HD
P1BF
BF
DELAY Q022
IC005 CX20061
PAL REC/PB C SECAM PB C
SECAM REC
D013
PB9V
RV005 CAR-BAL
IC006 ⑲ REC/PB
IC006 ⑭ REC/PB
IC006 ㉘ BF PB
IC004 ⑧ REC
IC009 ㉜ REC
DL001 1H+λ/4 DELAY
RV002 EX CHROMA LEVEL
QUASI BURST
IC003 CX10023
SW CONT
JUMP DET
Q020
PHASE INVERT
PHASE SHIFT Q024
fH VCO
DET
HD
RV003 JOG PLL
Q029 BELL FILTER
L003 BELL FILLER
Q620 AMP
SECAM MODE DISCRIMINATOR IC002 BA7007
RV001 SECAM ACK
CF001 4.16MHz
LV001 SECAM ACK FRQ
Q021
Q019
IC001 BA634
1/2
RF SW P
D006 (1/2)
Q100-Q102
B/W
COLOR
IC002 ⑦ REC/PB
IC009 ㉜ PB
SECAM REC
RV021 AGC
IC009 CX20043 (1/2)
SYNC SEP
GATE PULSE
AGC DET
MUTE
CLAMP
LIM
HPF
ATT
LPF
REC Y
REC C
PB Y
IC009 ⑥ ㊲ REC
IC009 ㉚ REC
IC009 ㉕ REC
IC009 ㊳ PB
Q041-045
NON-LINEAR PRE-EMPHASIS Q039,040
WHITE/DARK CLIP CARRIER SET DEVIATION Q035-038
RV016 COMPRESS
RV012 DARK CLIP
RV013 WHITE CLIP
RV014 CARRIER SET
RV015 DEVIATION
RF SW P
688k TRAP
FM MOD
FM DET
Q056
PHASE COMP Q054,055
NON-LINER DE-EMPHASIS Q050-053
RV020 EXPAND
APERTURE COMP Q048,049
Q047
RV019 PB LEVEL
A' HEAD
Q604
RV602 Y REC CURR
IC009 CX20043 (1/2)
DOC DET
Q603
RV010 DOC LEVEL
D023
Q602
DOC PAUSE
MC
DOC PULSE
Q075
IC401 CX866
13.3MHz
AM MOD
1H DL DL401
RV401 Y COMB
LPF Q401
IC009 ㉙ PB
IC401 ㉖ PB
IC009 ⑱ PB
IC009 ㉑ PB
RP-20 BOARD
IC503 ⑱ PB
A' HEAD Q510
RF SW P
RV503 CH BALANCE
PB 12V
BCH PB EQ
ACH PB EQ
RV501
RV502
Q504
IC502 TC4053BP
IC503 ⑯, ⑰ PB
VIDEO HEAD A
VIDEO HEAD B
VIDEO HEAD A'
SW
EQ
TRAP
LIMITER
REC SW
REC PAUSE
BIAS SW
Q501-Q503
IC503 CX134A
IC503 ④ PB
IC501 CX862
Q508 BUFFER
IC501 ⑤, ⑪ REC


YC-31 BOARD
PAL
SECAM
IC006 ㊲ PB
IC006 ㉟ PB
IC004 ⑧ PB 0.8Vp-p
IC006 ㊲ PB 0.24Vp-p
IC004 ⑧ PB
REC 0.68Vp-p
REC 0.2Vp-p
REC 0.6Vp-p
COUNTER BELL FILTER Q027,028
SECAM PB C
SECAM PB
LV002 COUNTER BELL FILTER
CHROMA REVERSE (B-ID)
F.F
ID DET
P.C
IC006 CX10021
RV009 P BURST LEVEL
ACC DET
ACK DET
ACK
PIB ADD
CF002 5.12MHz
CONV I
PLL X3
13.3MHz CF003
APC DET
1/8
COUNTER
APC ID
VXO
AFC DET
HD Ge
CV001 APC
X001 4.43MHz
Q030
REF 4.43MHz
PHASE SHIFT Q023
CH SW
A' HEAD Q601
A' HEAD
COMP SYNC
HD
REC C
PB C
DELAY Q022
BF
RF SW P
IC006 ㉘ BF PB
IC006 ⑲ REC/PB
IC006 ⑭ REC/PB
PAL PB
SECAM REC C
PAL REC/PB C
SECAM PB C
IC005 CX20061
RV005 CAR-BAL
D013
PB9V
SECAM REC
D009
ACK
Q025
Q026
PAL ACK
IC004 CX894
COMP SYNC
DL001 1H+1/4 DELAY
RV002 EX CHROMA LEVEL
Q620 AMP
SECAM MODE DISCRIMINATOR IC002 BA7007
RV001 SECAM ACK
CF001 4.16MHz
LV001 SECAM ACK FRQ
Q021
QUASI BURST
IC003 CX10023
SW
SW CONT
JUMP DET
PHASE INVERT
PHASE SHIFT Q024
CF
1H VCO
DET
HD
RV003 JOG PLL
Q029 BELL FILTER
L003 BELL FILLER
Q019
IC001 BA634
1/2
RF SW P
D006 (1/2)
IC002 ⑦ REC/PB
IC002 ⑨ REC/PB
IC009 ㉜ PB
Q100-Q102
B/W
COLOR
AUDIO IN
AUDIO OUT (AUDIO)
V MUTE
AUDIO IN (AUDIO)
RF AUDIO (RF MODULATOR)
AUDIO OUT
Q067
REF 4.43MHz
TEST SIGNAL GENERATEOR IC012 CX7926
S601 TEST SIGNAL
Q065
Q069
RF VIDEO (RF MODULATOR)
VIDEO OUT
RV021 AGC
IC009 CX20043 (1/2)
SYNC SEP
GATE PULSE
AGC DET
MUTE
QUASI VD INSERTION Q060-064
V BP (SYSTEM CONTROL)
CHROMA TRAP
VIDEO IN
IC011 CX20061
TU VIDEO IN (TUNER)
TU SEL IN (TUNER)
D027
IC009 ㉟ REC
IC009 ㉟ PB
IC009 ㉟ REC 1.8Vp-p
IC009 ③ REC 1Vp-p
IC009 ⑥ ㊲ REC
IC009 ㉚ REC
IC009 ㉕ REC
IC009 ㊳ PB
IC009 ③ REC
CLAMP
LIM
HPF
ATT
LPF
Q041-045
NON-LINEAR PRE-EMPHASIS Q039,040
WHITE/DARK CLIP CARRIER SET DEVIATION Q035-038
RV016 COMPRESS
RV012 DARK CLIP
RV013 WHITE CLIP
RV014 CARRIER SET
RV015 DEVIATION
688k TRAP
FM MOD
FM DET
Q056
PHASE COMP Q054,055
NON-LINER DE-EMPHASIS Q050-053
RV020 EXPAND
APERTURE COMP Q048,049
Q047
RV019 PB LEVEL
A' HEAD Q604
RV602 Y REC CURR
IC009 CX20043 (1/2)
DOC DET
Q603
RV010 DOC LEVEL
D023
Q602
DOC PAUSE
A' HEAD
DOC PULSE
Q075
IC401 CX866
CL
AM MOD
1H DL DL401
RV401 Y COMB
LPF Q401
13.3MHz
IC009 ㉙ PB
IC401 ㉖ PB
IC009 ⑱ PB
IC009 ㉑ PB
Q016 MC (SYSTEM CONTROL)
Q068 RF SW P (SERVO)
Q015, Q617 PB 12V SWD 12V PB 9V
PB+AUDIO DUB
Q010, Q011 6.5V REG SWD 9V
(SYSTEM CONTROL)
Q510 A' HEAD
RV503 CH BALANCE PB 12V
BCH PB EQ
ACH PB EQ
RV501
RV502
Q504
IC502 TC4053BP
EQ
SW
TRAP
LIMITER
IC503 CX134A
REC·PAUSE
PB 12V
Q501-Q503
Q508 BUFFER
IC503 ⑯,⑰ PB
IC503 ④ PB
REC Y
PB Y

CONTROL BLOCK DIAGRAM


FU-35 BOARD
S8
POWER
S6
PAUSE
S4
FF
S2
REW
S7
REC
S5
PB
S3
STOP
S1
EJECT
C ON
C DOWN
REC PROOF
THREADING END
RV602
STILL TRACKING
Q616
IC602
TAPE TOP/UNTHREAD END SENSOR
TAPE END SENSOR
TAPE END SENSOR
(TIMER BLOCK)
SYS RESET
RD-20 BOARD
PC1
S REEL ROTATION SENSOR
RV601
V HOLD
RD-21 BOARD
PC101
T REEL ROTATION SENSOR
(AUDIO BLOCK)
AUDIO MUTE
BIAS CONT
PB
Q620
(VIDEO BLOCK)
PB
MC
Q348
DOC PULSE
Q617
N BOARD
REMOTE CONTROL RECEIVER
IC604
Q605-608
NOISE PULSE DETECT
IC601
SYSTEM CONTROL
17 PWR ON/OFF
3 F SW2
13 F SW1
15 M SW
36 BRK ADJ
24 TOP/END
25 END SENS
74 SEND REQ
72 SYS REQ
61 RESET
63 S DATA ST
64 S DATA TS
65 S CLK
22 S REEL FG
16 V HOLD
23 T REEL FG
5 A MUTE
27 BIAS CONT 2
78 PB+AUDIO DUB
79 REC·PAUSE
80 DOC PULSE
3 MC
76 A' HEAD
70 V BP
77 V MUTE
80 DOC PAUSE
66 IR
68 IR
75 NOISE P
CLOCK 60
CLOCK 59
CF601
UN BRK S 31
UN BRK H 30
PINCH S 32
PINCH H 35
UNLOAD 26
LOAD 27
REEL FWD 48
PB + REC1 58
F/R 57
REEL STOP 54
UNLOAD 53
DP CUT 38
CAP REC 37
CAP RVS 49
CAP STOP 52
CUE/REV 47
DRUM ROT 39
CAP ROT 41
RESET 194 42
CAP CUT 43
REC·PAUSE 51
DRUM STOP 28
RF SW P 69
DRUM LOCK 29
VD/CTL 67
Q623,Q624
THREADING END DETECT
Q602
SOLENOID DRIVE
Q604
SOLENOID DRIVE
Q601
SOLENOID DRIVE
Q603
SOLENOID DRIVE
IC603
LOADING/THREADING MOTOR DRIVE
LOAD M (+)
LOAD M (−)
REEL FWD
Q618
Q619
Q314-Q318,Q335-Q338,Q349
REEL MOTOR CONTROL
REEL M
REEL STOP
STOP
REC
Q621
CUE/REV
(SERVO BLOCK)
BRAKE SOLENOID
PINCH SOLENOID
M
LOADING/THREADING MOTOR
M
REEL MOTOR
IC701(1/2)
BRAKE CONTROL
IC701(1/2)
TIMING CONTROL
Q701
RV603
BRAKE
ES-3 BOARD
SS-34 BOARD

NTROL INTERFACE

OL-VIDEO BLOCK INTERFACE]

I/O	IC601 Pin No.	STOP	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC OR TIMER REC	REC PAUSE	WAIT PAUSE	FR SEARCH	
							CUE	REV				CUE	REV
O	①	L	L	L	L	H	L	L	L	H	*1	L	L
O	③	L	L	L	L	H	H	H	L	L	L	H	H
O	(70)	H	H	H	H	H	H	H	H	H	H	H	H
O	(76)	L	L	L	L	H	L	L	L	L	L	L	L
O	(77)	L	L	L	L	L	L	L	L	L	L	L	L
O	(78)	L	L	L	H	H	H	H	L	L	L	H	H
O	(79)	L	L	L	L	L	L	L	H	L	L	L	L
O	(80)	L	L	L	L	L	L	L	L	L	L	L	L

ulse

[SYSTEM CONTROL-SERVO BLOCK INTERFACE]

SIGNAL	I/O	IC601 Pin No.	STOP	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC OR TIMER REC	REC PAUSE	WAIT PAUSE	FR SEARCH	
								CUE	REV				CUE	REV
S REEL FG	I	㉒	H/L	FG	FG	FG	H/L	FG	FG	FG	H/L	H/L	FG	FG
T REEL FG	I	㉓	H/L	FG	FG	FG	H/L	FG	FG	FG	H/L	H/L	FG	FG
DRUM STOP	O	㉘	H	L	L	L	L	L	L	L	L	H	L	L
$\overline{\text{DRUM LOCK}}$	I	㉙	L	H	H	H	H	H	H	H	H	L	H	H
$\overline{\text{BRK ADJ}}$	O	㊱	H	H	H	H	H	H	H	H	H	H	H	H
REC	O	㊲	L	L	L	L	L	L	L	H	H	L	L	L
DP CUT	O	㊳	L	L	L	L	H	H	H	L	L	L	H	H
DRUM ROT	I	㊴	L	H	H	H	H	H	H	H	H	L	H	H
CAP ROT	I	㊶	L	L	L	H	H	H	H	H	H	L	L	L
RESET 194	O	㊷	L	L	L	L	L	L	L	L	L	L	L	L
CAP CUT	O	㊸	L	L	L	L	L	L	L	L	L	L	L	L
PB + REC 2 *1	O	㊹	L	L	L	H	H	L	L	H	H	L	L	L
$\overline{\text{BIAS CONT 1}}$ *1	O	㊺	L	L	L	L	L	L	L	H	H	L	L	L
$\overline{\text{CUE/REV}}$	O	㊼	H	H	H	H	H	L	L	H	H	H	H	H
$\overline{\text{CAP RVS}}$	O	㊾	H	H	H	H	H	H	L	H	H	H	H	H
WITHN/$\overline{\text{N.LESS}}$	I	㊿	L	L	L	L	L	L	L	L	L	L	L	L
$\overline{\text{REC}}\cdot\overline{\text{P}}$	O	(51)	H	H	H	H	H	H	H	L	H	H	H	H
CAP STOP	O	(52)	H	H	H	L	L	L	L	L	L	H	H	H
$\overline{\text{PAUSE}}$	O	(56)	H	H	H	H	L	H	H	H	L	*2	H	H
VD/CTL	I	(67)	L	PB CTL	PB CTL	PB CTL	L	PB CTL	PB CTL	VD	L	L	PB CTL	PB CTL
RF SW P	I	(69)	H/L	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	H/L	RF SWP	RF SWP
NOISE P	I	(75)	L	L	L	L	L	L	L	L	L	L	L	L

*1 : NOT USED
*2 : T=2(SEC), 50% duty ratio pulse

ITROL-REEL MOTOR BLOCK INTERFACE]

L	I/O	IC601 Pin No.	EJECTED	LOADING	THREADING	STOP	UN-THREADING	UN-LOADING	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC	REC PAUSE	FR SEARCH	
													CUE	REV			CUE	REV
	O	㊼	H	H	H	H	H	H	H	H	H	H	L	L	H	H	H	H
	O	㊽	L	L	L	L	H	L	L	H	L	L	L	H	L	L	L	H
	O	(54)	H	H	L	H	L	H	L	L	L	H	L	L	L	H	L	L
	O	(57)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H
	O	(58)	L	L	L	L	L	L	L	L	H	H	L	L	H	H	L	L
	O	(53)	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H

ITROL-MECHANISM BLOCK INTERFACE]

L	I/O	IC601 Pin No.	EJECTED	LOADING	THREADING	STOP	UN-THREADING	UN-LOADING	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC	REC PAUSE	FR SEARCH	
													CUE	REV			CUE	REV
	I	⑮	5V	3V	1V (2V)	0V	1V (2V)	3V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V
	O	㉔	L	L	L	L	H	H	L	H	L	L	L	H	L	L	L	H
	I	㉕	H	H/L	H/L	H	H	L	H	H	H	H	H	H	H	H	H	H
	O	㉖	L	L	L	L	H	H	L	L	L	L	L	L	L	L	L	L
	O	㉗	L	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L
	O	㉚	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H
	O	㉛	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	O	㉜	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	O	㉟	L	H	L	L	L	H	L	L	H	H	H	H	H	H	L	L

*1 (   ) : THE SAFTY TAB OF THE CASSETTE IS BROKEN

NTROL-AUDIO BLOCK INTERFACE]

	I/O	IC601 Pin No.	MODE											
			STOP	FF	REW	PB	PB· PAUSE	PICTURE SEARCH		REC OR TIMER REC	REC· PAUSE	WAIT PAUSE	FR SEARCH	
								CUE	REV				CUE	REV
3 *1	O	④	L	L	L	L	L	L	L	L	L	L	L	L
	O	⑤	L	L	L	L	H	H	H	L	L	L	H	H
2	O	(55)	L	L	L	L	L	L	L	H	L	L	L	L
DUB	O	(78)	L	L	L	H	H	H	H	L	L	L	H	H

*1 NOT USED

ROL-ITS PERIPHERAL CIRCUIT INTERFACE]

I/O	IC601 Pin No.	MODE									
		USUAL	PRESSED BUTTON								
			EJECT	STOP	PB	REC		REW	FF	PAUSE	POWER
I	⑬	5V	0V	1V	2V	3V		–	–	–	–
I	⑭	5V	–	–	–	–		0V	1V	2V	–
I	⑯	0V – 5V [*1]	–	–	–	–		–	–	–	–
I	⑰	5V	–	–	–	–		–	–	–	0V
I	(66), (68)	5V	–	–	–	–		–	–	–	–

ROL-TIMER INTERFACE]

IC601 Pin No.	MODE
	USUAL
(63)	L
(64)	L
(65)	H
(72)	H
(74)	H

[TIMER-TUNER INTERFACE (1)]

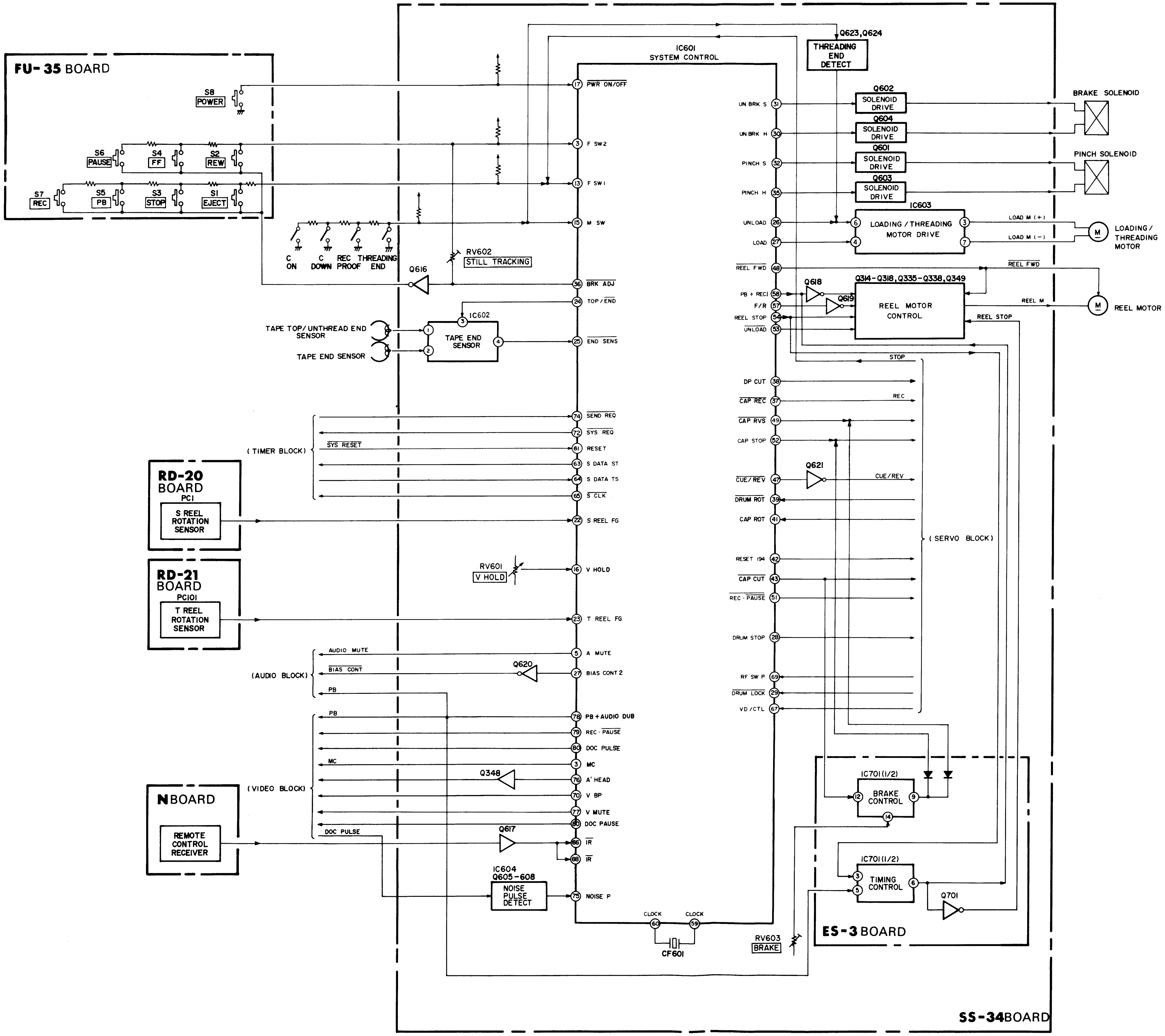
SIGNAL	I/O	IC001 Pin No.	FL DISPLAY INDICATION		
			PROG. No.	AU	BLANK
P00	I	①	[*1]	L	L
P01	I	②	[*1]	L	L
P02	I	③	[*1]	L	L
P03	I	④	[*1]	L	L
P10	I	⑤	[*1]	L	L
P11	I	⑥	[*1]	L	L
$\overline{\text{PR RESET}}$	O	(58)	H	H	H
$\overline{\text{PR UP}}$	O	(59)	H	H	H
PR LOCK	O	(60)	L	L	L
TU SEL	O	(61)	H	L	L

[*1] REFER TO "TIMER–TUNER INTERFACE (2)".

[TIMER-TUNER INTERFACE (2)]

	IC001 INPUT						IC001 OUTPUT (INDICATION)			IC001 INPUT						IC001 OUTPUT (INDICATION)	
PROG. No.	P11	P10	P03	P02	P01	P00	10 digit	1 digit	PROG. No.	P11	P10	P03	P02	P01	P00	10 digit	1 digit
1	H	H	L	L	L	H		1	18	L	H	H	L	L	L	1	8
2	H	H	L	L	H	L		2	19	L	H	H	L	L	H	1	9
3	H	H	L	L	H	H		3	20	H	L	L	L	L	L	2	0
4	H	H	L	H	L	L		4	21	H	L	L	L	L	H	2	1
5	H	H	L	H	L	H		5	22	H	L	L	L	H	L	2	2
6	H	H	L	H	H	L		6	23	H	L	L	L	H	H	2	3
7	H	H	L	H	H	H		7	24	H	L	L	H	L	L	2	4
8	H	H	H	L	L	L		8	25	H	L	L	H	L	H	2	5
9	H	H	H	L	L	H		9	26	H	L	L	H	H	L	2	6
10	L	H	L	L	L	L	1	0	27	H	L	L	H	H	H	2	7
11	L	H	L	L	L	H	1	1	28	H	L	H	L	L	L	2	8
12	L	H	L	L	H	L	1	2	29	H	L	H	L	L	H	2	9
13	L	H	L	L	H	H	1	3	0	H	H	L	L	L	L		0
14	L	H	L	H	L	L	1	4	LINE	L	L	H	H	L	L	A	U
15	L	H	L	H	L	H	1	5	BLANK	H	H	H	H	H	H		
16	L	H	L	H	H	L	1	6	1–	L	H	H	H	H	H	1	
17	L	H	L	H	H	H	1	7	2–	H	L	H	H	H	H	2	

3-4. SYSTEM CONTROL BLOCK DIAGRAM


FU-35 BOARD
S8 POWER
S6 PAUSE
S4 FF
S2 REW
S7 REC
S5 PB
S3 STOP
S1 EJECT
C ON
C DOWN
REC PROOF
THREADING END
Q616
RV602 STILL TRACKING
IC602
TAPE END SENSOR
TAPE TOP/UNTHREAD END SENSOR
TAPE END SENSOR
(TIMER BLOCK)
SYS RESET
RD-20 BOARD
PC1
S REEL ROTATION SENSOR
RD-21 BOARD
PC101
T REEL ROTATION SENSOR
RV601 V HOLD
(AUDIO BLOCK)
AUDIO MUTE
BIAS CONT
PB
Q620
(VIDEO BLOCK)
MC
Q348
N BOARD
REMOTE CONTROL RECEIVER
DOC PULSE
Q617
IC604 Q605-608
NOISE PULSE DETECT
IC601
SYSTEM CONTROL
17 PWR ON/OFF
3 F SW2
13 F SW1
15 M SW
36 BRK ADJ
24 TOP/END
25 END SENS
74 SEND REQ
72 SYS REQ
61 RESET
63 S DATA ST
64 S DATA TS
65 S CLK
22 S REEL FG
16 V HOLD
23 T REEL FG
5 A MUTE
27 BIAS CONT 2
78 PB+AUDIO DUB
79 REC · PAUSE
80 DOC PULSE
3 MC
76 A' HEAD
70 V BP
77 V MUTE
80 DOC PAUSE
66 IR
68 IR
75 NOISE P
CLOCK 60
CLOCK 59
CF601
UN BRK S 31
UN BRK H 30
PINCH S 32
PINCH H 35
UNLOAD 26
LOAD 27
REEL FWD 48
PB + REC1 58
F/R 57
REEL STOP 54
UNLOAD 53
DP CUT 38
CAP REC 37
CAP RVS 49
CAP STOP 52
CUE/REV 47
DRUM ROT 39
CAP ROT 41
RESET 194 42
CAP CUT 43
REC · PAUSE 51
DRUM STOP 28
RF SW P 69
DRUM LOCK 29
VD/CTL 67
Q623, Q624
THREADING END DETECT
Q602 SOLENOID DRIVE
Q604 SOLENOID DRIVE
Q601 SOLENOID DRIVE
Q603 SOLENOID DRIVE
IC603
LOADING/THREADING MOTOR DRIVE
LOAD M (+)
LOAD M (−)
REEL FWD
Q618
Q619
Q314-Q318, Q335-Q338, Q349
REEL MOTOR CONTROL
REEL M
REEL STOP
STOP
REC
Q621
CUE/REV
(SERVO BLOCK)
BRAKE SOLENOID
PINCH SOLENOID
LOADING/THREADING MOTOR
REEL MOTOR
IC701 (1/2)
BRAKE CONTROL
IC701 (1/2)
TIMING CONTROL
Q701
ES-3 BOARD
RV603 BRAKE
SS-34 BOARD

3-5. SYSTEM CONTROL INTERFACE

[SYSTEM CONTROL-VIDEO BLOCK INTERFACE]

SIGNAL	I/O	IC601 Pin No.	STOP	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC OR TIMER REC	REC PAUSE	WAIT PAUSE	FR SEARCH	
								CUE	REV				CUE	REV
PAUSE	O	①	L	L	L	L	H	L	L	L	H	*1	L	L
MC	O	③	L	L	L	L	H	H	H	L	L	L	H	H
VBP	O	(70)	H	H	H	H	H	H	H	H	H	H	H	H
A'HEAD	O	(76)	L	L	L	L	H	L	L	L	L	L	L	L
V MUTE	O	(77)	L	L	L	L	L	L	L	L	L	L	L	L
PB + AUDIO DUB	O	(78)	L	L	L	H	H	H	H	L	L	L	H	H
REC · $\overline{\text{P}}$	O	(79)	L	L	L	L	L	L	L	H	L	L	L	L
DOC PAUSE	O	(80)	L	L	L	L	L	L	L	L	L	L	L	L

*1 : T = 2(SEC),
50% duty ratio pulse

[SYSTEM CONTROL-SERVO BLOCK INTERFACE]

SIGNAL	I/O	IC601 Pin No.	STOP	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC OR TIMER REC	REC PAUSE	WAIT PAUSE	FR SEARCH	
								CUE	REV				CUE	REV
S REEL FG	I	㉒	H/L	FG	FG	FG	H/L	FG	FG	FG	H/L	H/L	FG	FG
T REEL FG	I	㉓	H/L	FG	FG	FG	H/L	FG	FG	FG	H/L	H/L	FG	FG
DRUM STOP	O	㉘	H	L	L	L	L	L	L	L	L	H	L	L
$\overline{\text{DRUM LOCK}}$	I	㉙	L	H	H	H	H	H	H	H	H	L	H	H
$\overline{\text{BRK ADJ}}$	O	㊱	H	H	H	H	H	H	H	H	H	H	H	H
REC	O	㊲	L	L	L	L	L	L	L	H	H	L	L	L
DP CUT	O	㊳	L	L	L	L	H	H	H	L	L	L	H	H
DRUM ROT	I	㊴	L	H	H	H	H	H	H	H	H	L	H	H
CAP ROT	I	㊶	L	L	L	H	H	H	H	H	H	L	L	L
RESET 194	O	㊷	L	L	L	L	L	L	L	L	L	L	L	L
CAP CUT	O	㊸	L	L	L	L	L	L	L	L	L	L	L	L
PB + REC 2 *1	O	㊹	L	L	L	H	H	L	L	H	H	L	L	L
$\overline{\text{BIAS CONT 1}}$ *1	O	㊺	L	L	L	L	L	L	L	H	H	L	L	L
$\overline{\text{CUE/REV}}$	O	㊼	H	H	H	H	H	L	L	H	H	H	H	H
$\overline{\text{CAP RVS}}$	O	㊾	H	H	H	H	H	H	L	H	H	H	H	H
WITHN/$\overline{\text{N.LESS}}$	I	㊿	L	L	L	L	L	L	L	L	L	L	L	L
$\overline{\text{REC}\cdot\overline{\text{P}}}$	O	(51)	H	H	H	H	H	H	H	L	H	H	H	H
CAP STOP	O	(52)	H	H	H	L	L	L	L	L	L	H	H	H
$\overline{\text{PAUSE}}$	O	(56)	H	H	H	H	L	H	H	H	L	*2	H	H
VD/CTL	I	(67)	L	PB CTL	PB CTL	PB CTL	L	PB CTL	PB CTL	VD	L	L	PB CTL	PB CTL
RF SW P	I	(69)	H/L	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	RF SWP	H/L	RF SWP	RF SWP
NOISE P	I	(75)	L	L	L	L	L	L	L	L	L	L	L	L

*1 : NOT USED
*2 : T=2(SEC),
50% duty ratio pulse

[SYSTEM CONTROL-REEL MOTOR BLOCK INTERFACE]

SIGNAL	I/O	IC601 Pin No.	EJECTED	LOADING	THREADING	STOP	UN-THREADING	UN-LOADING	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC	REC PAUSE	FR SEARCH	
													CUE	REV			CUE	REV
CUE/$\overline{\text{REV}}$	O	㊼	H	H	H	H	H	H	H	H	H	H	L	L	H	H	H	H
$\overline{\text{REEL FWD}}$	O	㊽	L	L	L	L	H	L	L	H	L	L	L	H	L	L	L	H
REEL STOP	O	(54)	H	H	L	H	L	H	L	L	L	H	L	L	L	H	L	L
F/R	O	(57)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H
PB + REC 1	O	(58)	L	L	L	L	L	L	L	L	H	H	L	L	H	H	L	L
$\overline{\text{UNLOAD}}$	O	(53)	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H

[SYSTEM CONTROL-MECHANISM BLOCK INTERFACE]

SIGNAL	I/O	IC601 Pin No.	EJECTED	LOADING	THREADING	STOP	UN-THREADING	UN-LOADING	FF	REW	PB	PB PAUSE	PICTURE SEARCH		REC	REC PAUSE	FR SEARCH	
													CUE	REV			CUE	REV
M SW *1	I	⑮	5V	3V	1V (2V)	0V	1V (2V)	3V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V
TOP/$\overline{\text{END}}$	O	㉔	L	L	L	L	H	H	L	H	L	L	L	H	L	L	L	H
$\overline{\text{END SENS}}$	I	㉕	H	H/L	H/L	H	H	L	H	H	H	H	H	H	H	H	H	H
UNLOAD	O	㉖	L	L	L	L	H	H	L	L	L	L	L	L	L	L	L	L
LOAD	O	㉗	L	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L
UNBRK (H)	O	㉚	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H
UNBRK (S)	O	㉛	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
PINCH (S)	O	㉜	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
PINCH (H)	O	㉟	L	H	L	L	L	H	L	L	H	H	H	H	H	H	L	L

*1 ( ) : THE SAFTY TAB OF THE CASSETTE IS BROKEN

[SYSTEM CONTROL-AUDIO BLOCK INTERFACE]

SIGNAL	I/O	IC601 Pin No.	MODE											
			STOP	FF	REW	PB	PB-PAUSE	PICTURE SEARCH		REC OR TIMER REC	REC-PAUSE	WAIT PAUSE	FR SEARCH	
								CUE	REV				CUE	REV
AUDIO DUB *1	O	④	L	L	L	L	L	L	L	L	L	L	L	L
A MUTE	O	⑤	L	L	L	L	H	H	H	L	L	L	H	H
BIAS CONT 2	O	(55)	L	L	L	L	L	L	L	H	L	L	L	L
PB + AUDIO DUB	O	(78)	L	L	L	H	H	H	H	L	L	L	H	H

*1 NOT USED

[SYSTEM CONTROL-ITS PERIPHERAL CIRCUIT INTERFACE]

SIGNAL	I/O	IC601 Pin No.	MODE									
			USUAL	PRESSED BUTTON								
				EJECT	STOP	PB	REC		REW	FF	PAUSE	POWER
F SW 1	I	⑬	5V	0V	1V	2V	3V		–	–	–	–
F SW 2	I	⑭	5V	–	–	–	–		0V	1V	2V	–
V HOLD	I	⑯	0V – 5V *1	–	–	–	–		–	–	–	–
$\overline{\text{POWER ON/OFF}}$	I	⑰	5V	–	–	–	–		–	–	–	0V
$\overline{\text{IR}}$	I	(66), (68)	5V	–	–	–	–		–	–	–	–

*1: BY V HOLD VR

[SYSTEM CONTROL-TIMER INTERFACE]

SIGNAL	I/O	IC601 Pin No.	MODE
			USUAL
S DATA ST	O	(63)	L
S DATA TS	I	(64)	L
$\overline{\text{S CLK}}$	I	(65)	H
$\overline{\text{SYS REQ}}$	O	(72)	H
$\overline{\text{SEND REQ}}$	I	(74)	H

[TIMER-TUNER INTERFACE (1)]

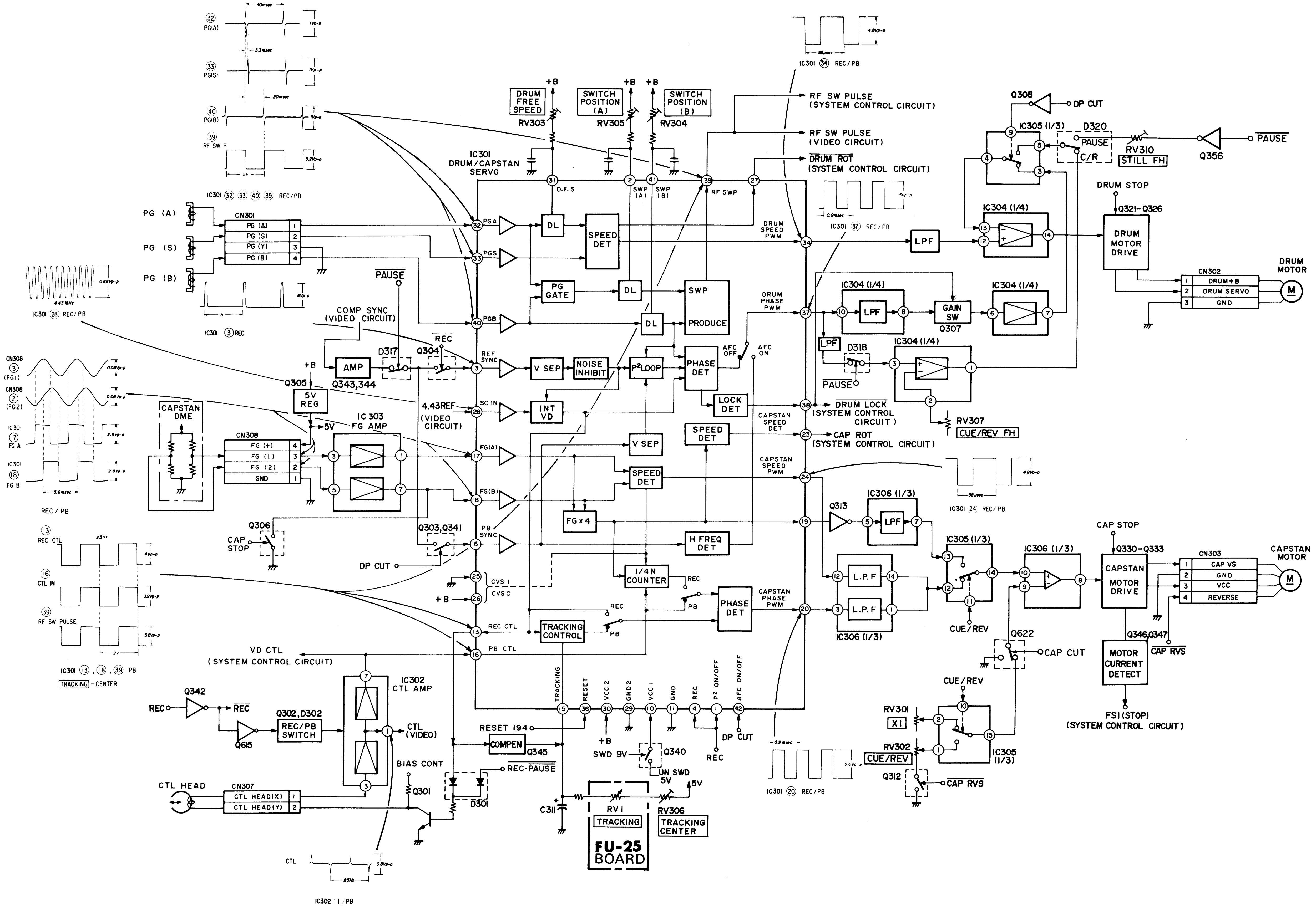
SIGNAL	I/O	IC001 Pin No.	FL DISPLAY INDICATION		
			PROG. No.	AU	BLANK
P00	I	①	*1	L	L
P01	I	②	*1	L	L
P02	I	③	*1	L	L
P03	I	④	*1	L	L
P10	I	⑤	*1	L	L
P11	I	⑥	*1	L	L
$\overline{\text{PR RESET}}$	O	(58)	H	H	H
$\overline{\text{PR UP}}$	O	(59)	H	H	H
PR LOCK	O	(60)	L	L	L
TU SEL	O	(61)	H	L	L

*1 REFER TO "TIMER–TUNER INTERFACE (2)".

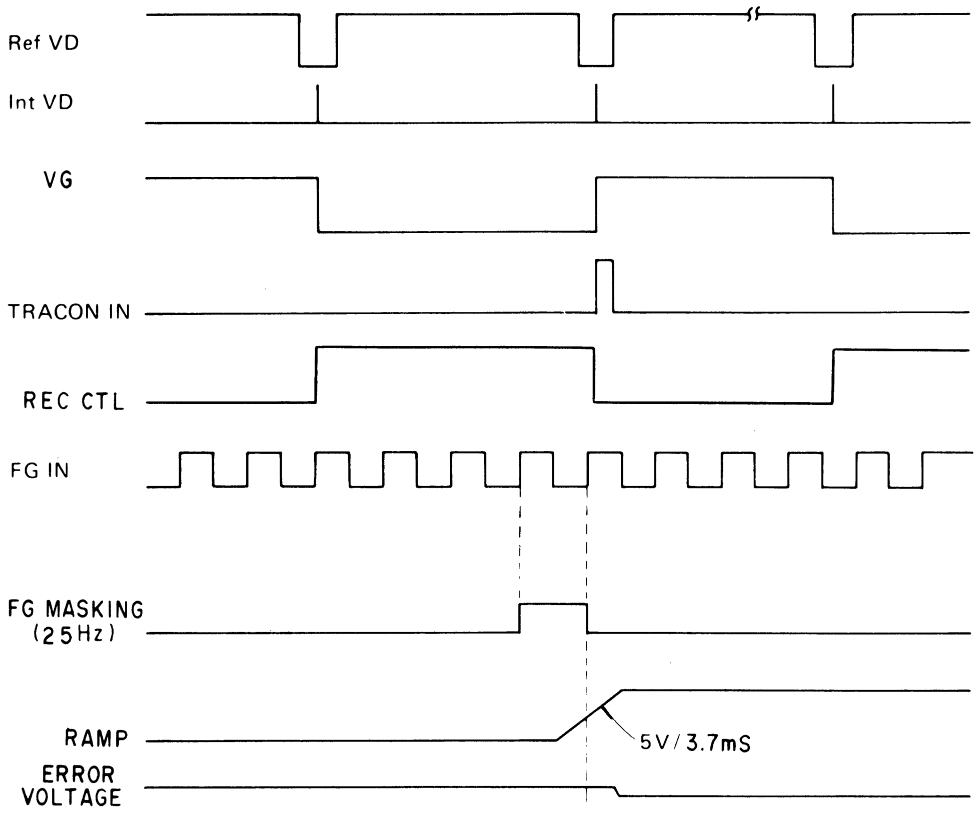
[TIMER-TUNER INTERFACE (2)]

	IC001 INPUT						IC001 OUTPUT (INDICATION)			IC001 INPUT						IC001 OUTPUT (INDICATION)	
PROG. No.	P11	P10	P03	P02	P01	P00	10 digit	1 digit	PROG. No.	P11	P10	P03	P02	P01	P00	10 digit	1 digit
1	H	H	L	L	L	H		1	18	L	H	H	L	L	L	1	8
2	H	H	L	L	H	L		2	19	L	H	H	L	L	H	1	9
3	H	H	L	L	H	H		3	20	H	L	L	L	L	L	2	0
4	H	H	L	H	L	L		4	21	H	L	L	L	L	H	2	1
5	H	H	L	H	L	H		5	22	H	L	L	L	H	L	2	2
6	H	H	L	H	H	L		6	23	H	L	L	L	H	H	2	3
7	H	H	L	H	H	H		7	24	H	L	L	H	L	L	2	4
8	H	H	H	L	L	L		8	25	H	L	L	H	L	H	2	5
9	H	H	H	L	L	H		9	26	H	L	L	H	H	L	2	6
10	L	H	L	L	L	L	1	0	27	H	L	L	H	H	H	2	7
11	L	H	L	L	L	H	1	1	28	H	L	H	L	L	L	2	8
12	L	H	L	L	H	L	1	2	29	H	L	H	L	L	H	2	9
13	L	H	L	L	H	H	1	3	0	H	H	L	L	L	L		0
14	L	H	L	H	L	L	1	4	LINE	L	L	H	H	L	L	A	U
15	L	H	L	H	L	H	1	5	BLANK	H	H	H	H	H	H		
16	L	H	L	H	H	L	1	6	1–	L	H	H	H	H	H	1	
17	L	H	L	H	H	H	1	7	2–	H	L	H	H	H	H	2	

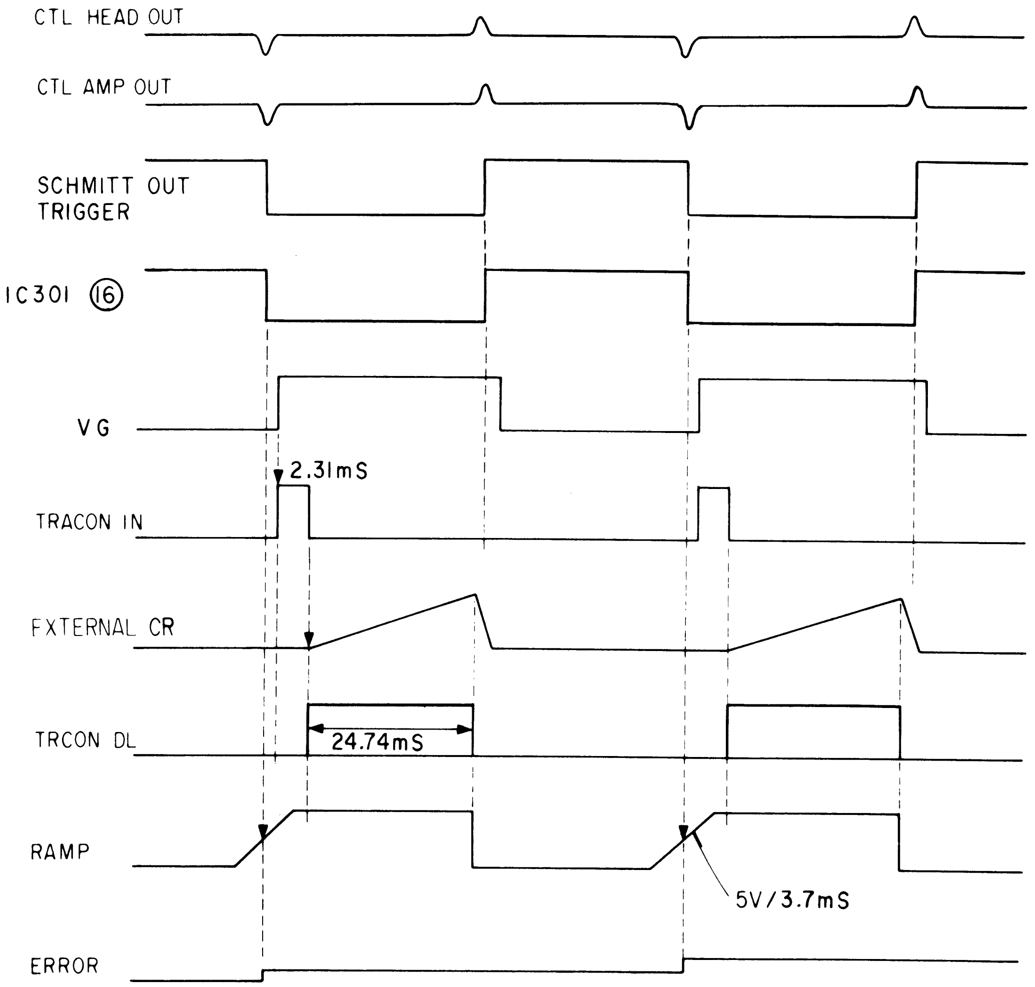
3-6. SERVO BLOCK DIAGRAM


IC301 DRUM/CAPSTAN SERVO
DRUM FREE SPEED
RV303
SWITCH POSITION (A)
RV305
SWITCH POSITION (B)
RV304
+B
D.F.S
SWP (A)
SWP (B)
RF SWP
RF SW PULSE (SYSTEM CONTROL CIRCUIT)
RF SW PULSE (VIDEO CIRCUIT)
DRUM ROT (SYSTEM CONTROL CIRCUIT)
IC301 (34) REC/PB
IC301 (37) REC/PB
IC301 (32) (33) (40) (39) REC/PB
PG(A)
PG(S)
PG(B)
RF SW P
PG (A)
PG (S)
PG (B)
CN301
PG (A)
PG (S)
PG (Y)
PG (B)
IC301 (28) REC/PB
IC301 (3) REC
4.43 MHz
PGA
PGS
PGB
DL
SPEED DET
PG GATE
SWP PRODUCE
DRUM SPEED PWM
DRUM PHASE PWM
PAUSE
COMP SYNC (VIDEO CIRCUIT)
REC
AMP
Q343,344
D317
Q304
Q305
5V REG
REF SYNC
V SEP
NOISE INHIBIT
P²LOOP
PHASE DET
AFC OFF
AFC ON
LOCK DET
4.43REF
(VIDEO CIRCUIT)
SC IN
INT VD
CN308
(FG1)
(FG2)
FG A
FG B
REC / PB
CAPSTAN DME
FG (+)
FG (1)
FG (2)
GND
IC 303 FG AMP
FG(A)
FG(B)
V SEP
SPEED DET
FG x 4
CAPSTAN SPEED DET
CAPSTAN SPEED PWM
CAPSTAN PHASE PWM
Q306
CAP STOP
Q303,Q341
PB SYNC
H FREQ DET
DP CUT
CVS I
CVS O
1/4N COUNTER
REC
PB
REC CTL
PB CTL
TRACKING CONTROL
VD CTL (SYSTEM CONTROL CIRCUIT)
REC CTL
CTL IN
RF SW PULSE
IC301 (13), (16), (39) PB
TRACKING - CENTER
Q342
REC
Q615
Q302,D302
REC/PB SWITCH
IC302 CTL AMP
CTL (VIDEO)
BIAS CONT
Q301
D301
CTL HEAD
CN307
CTL HEAD(X)
CTL HEAD(Y)
CTL
IC302 (1) PB
RESET 194
COMPEN
Q345
REC·PAUSE
TRACKING
RESET
VCC 2
GND2
VCC 1
GND
REC
P² ON/OFF
AFC ON/OFF
SWD 9V
Q340
UN SWD 5V
5V
C311
RV1 TRACKING
RV306 TRACKING CENTER
FU-25 BOARD
DP CUT
REC
IC301 (20) REC/PB
IC301 24 REC/PB
Q308
DP CUT
IC305 (1/3)
D320
PAUSE
C/R
RV310 STILL FH
Q356
PAUSE
DRUM STOP
IC304 (1/4)
Q321-Q326
DRUM MOTOR DRIVE
LPF
GAIN SW
Q307
D318
PAUSE
RV307 CUE/REV FH
DRUM LOCK (SYSTEM CONTROL CIRCUIT)
CAP ROT (SYSTEM CONTROL CIRCUIT)
DRUM MOTOR
CN302
DRUM + B
DRUM SERVO
GND
Q313
IC306 (1/3)
L.P.F
CUE/REV
Q622
CAP CUT
CAP STOP
Q330-Q333
CAPSTAN MOTOR DRIVE
CN303
CAP VS
GND
VCC
REVERSE
CAPSTAN MOTOR
Q346,Q347
CAP RVS
MOTOR CURRENT DETECT
FS1 (STOP) (SYSTEM CONTROL CIRCUIT)
RV301 X1
RV302 CUE/REV
Q312
CAP RVS
IC305 (1/3)
M

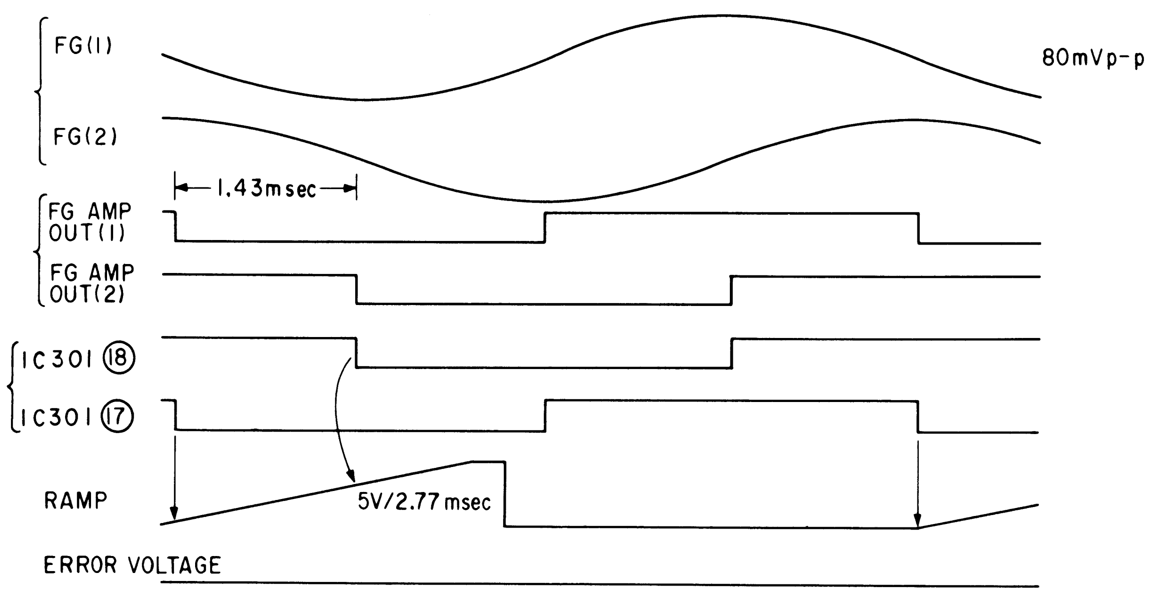
3-7. CAPSTAN PHASE SYSTEM TIMING CHART (REC)


Ref VD
Int VD
VG
TRACON IN
REC CTL
FG IN
FG MASKING
(25Hz)
RAMP
ERROR
VOLTAGE
5V/3.7mS

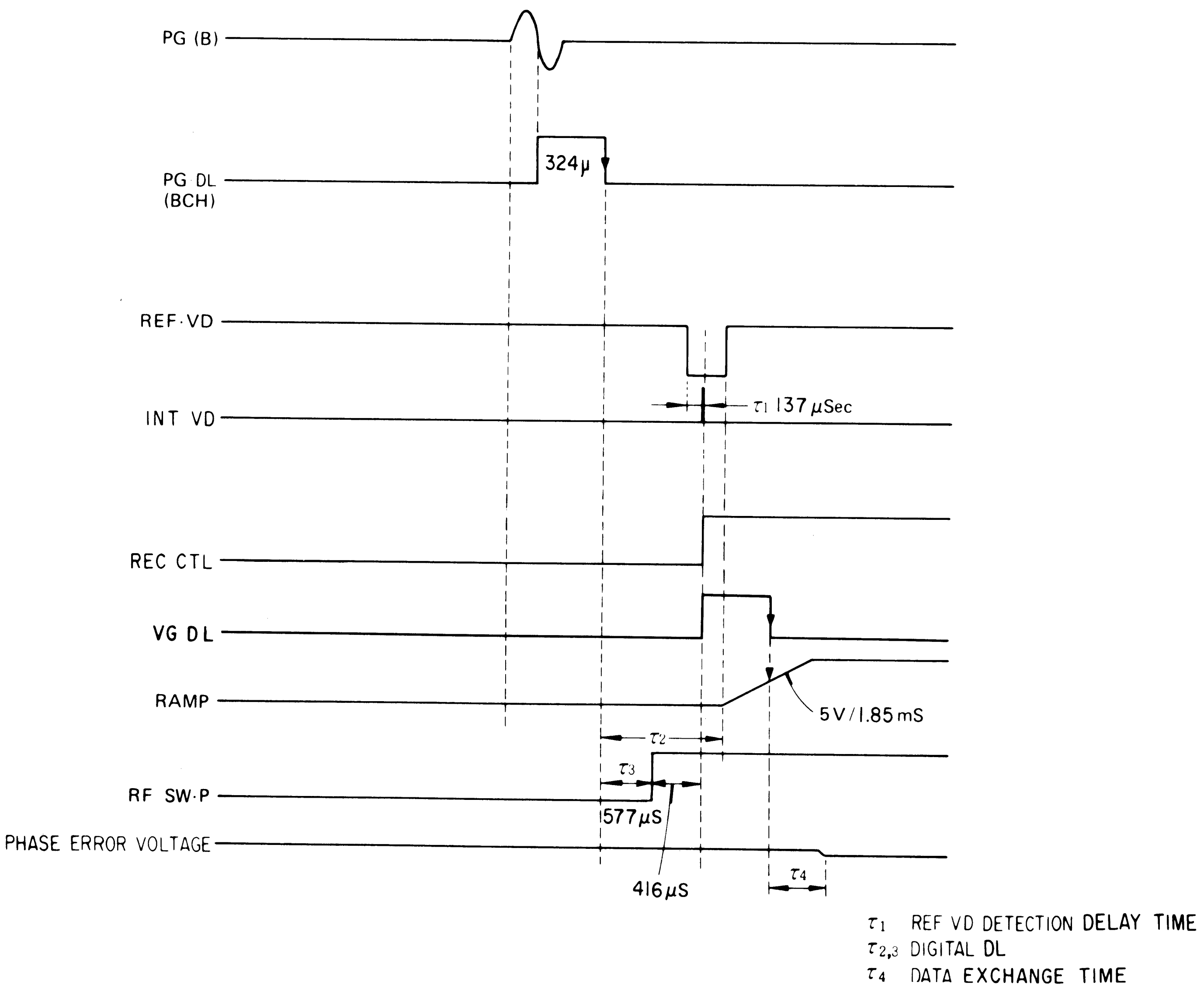
3-8. CAPSTAN PHASE SYSTEM TIMING CHART (PB)


CTL HEAD OUT
CTL AMP OUT
SCHMITT OUT
TRIGGER
IC301 ⑯
VG
2.31mS
TRACON IN
FXTERNAL CR
TRCON DL
24.74mS
RAMP
5V/3.7mS
ERROR

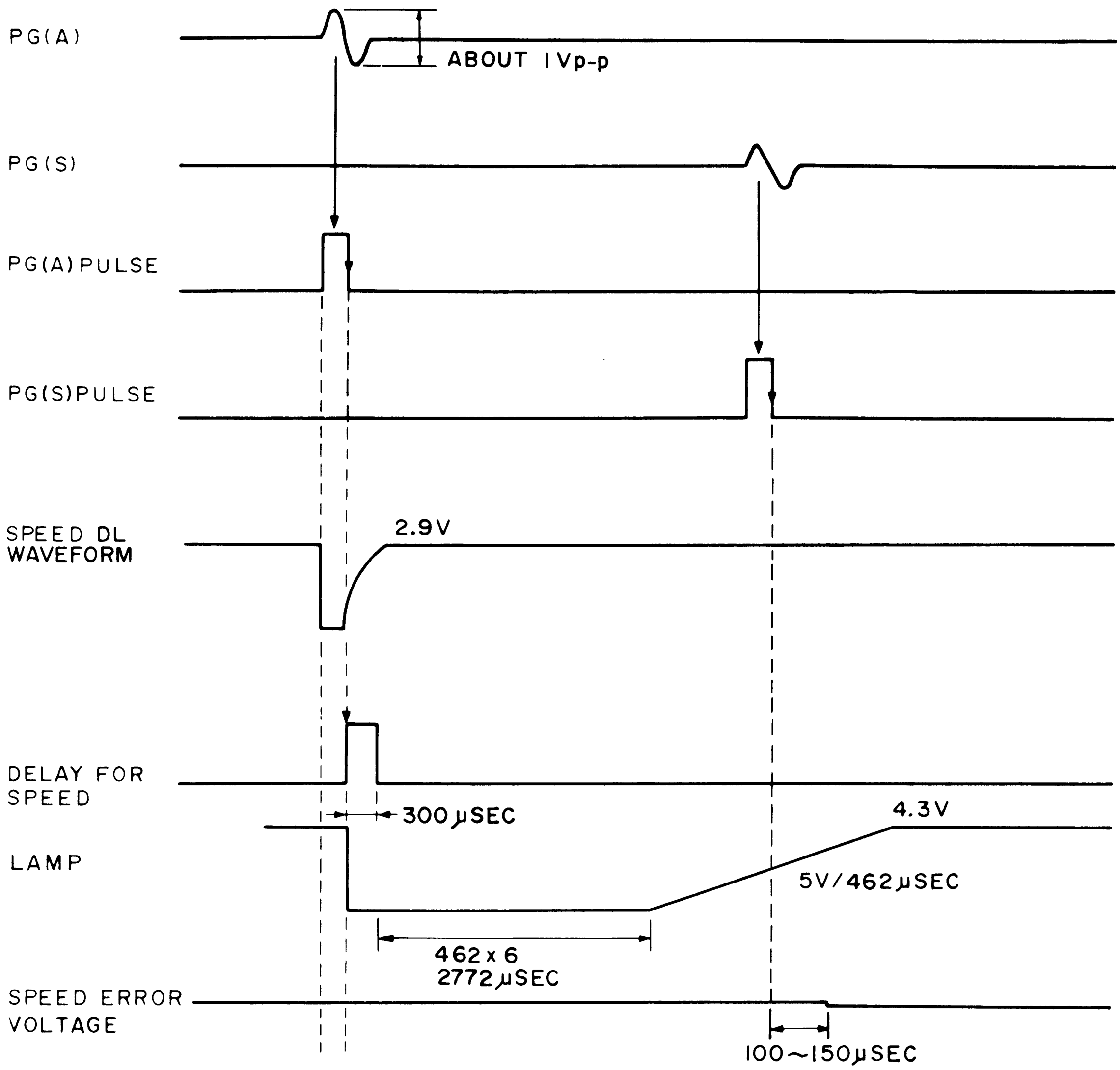
3-9. CAPSTAN SPEED SYSTEM TIMING CHART


FG(1)
FG(2)
80mVp-p
1.43msec
FG AMP
OUT(1)
FG AMP
OUT(2)
IC301 ⑱
IC301 ⑰
RAMP
5V/2.77msec
ERROR VOLTAGE

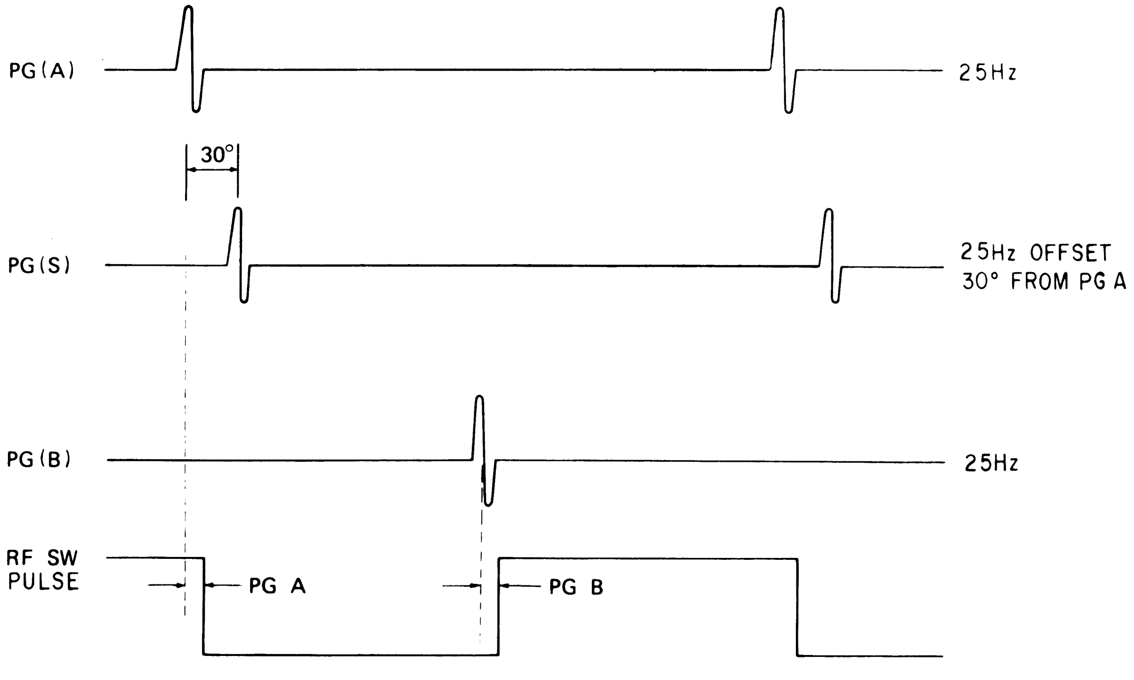
3-10. DRUM PHASE SYSTEM TIMING CHART


PG (B)
PG DL
(BCH)
324μ
REF·VD
INT VD
τ1 137μSec
REC CTL
VG DL
RAMP
5V/1.85mS
τ2
τ3
RF SW·P
577μS
416μS
PHASE ERROR VOLTAGE
τ4
τ1 REF VD DETECTION DELAY TIME
τ2,3 DIGITAL DL
τ4 DATA EXCHANGE TIME

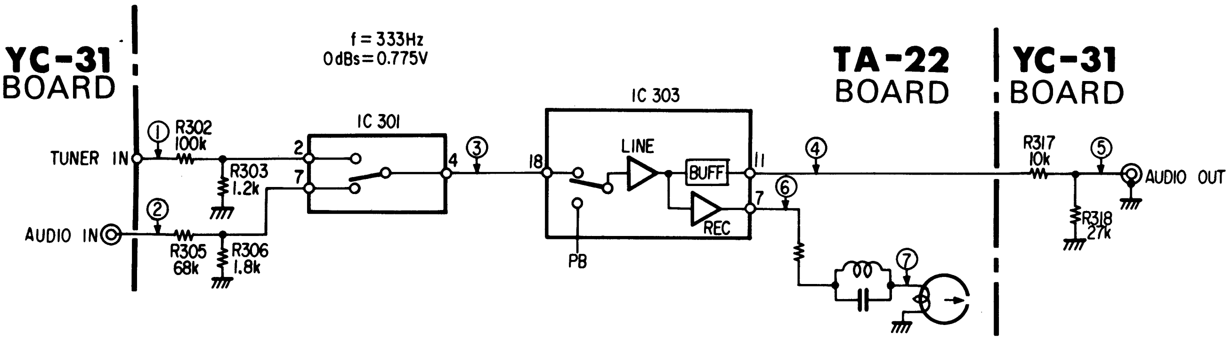
3-11. DRUM SPEED SYSTEM TIMING CHART

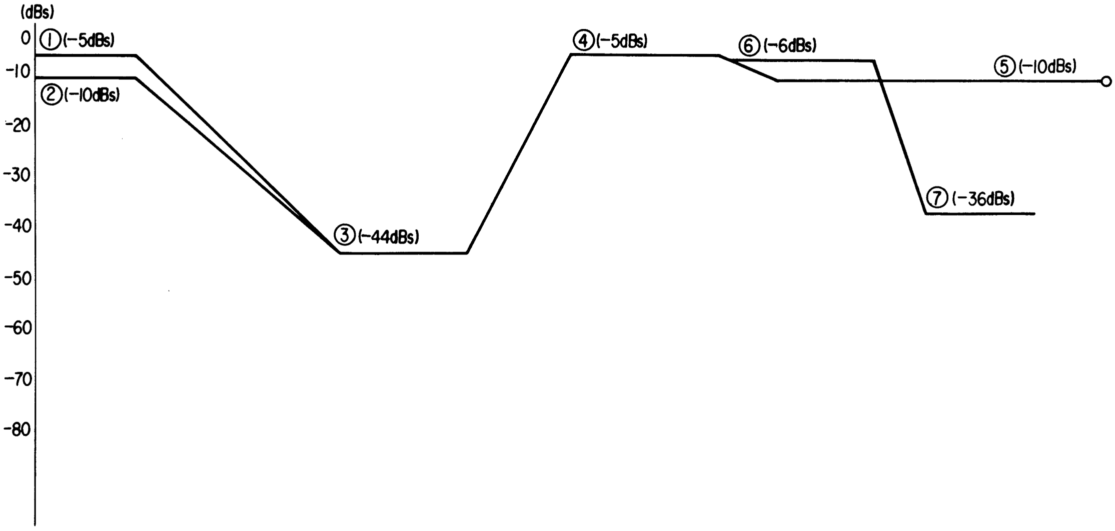

PG(A)
ABOUT 1Vp-p
PG(S)
PG(A) PULSE
PG(S) PULSE
SPEED DL WAVEFORM
2.9V
DELAY FOR SPEED
300μSEC
4.3V
LAMP
5V/462μSEC
462 x 6
2772μSEC
SPEED ERROR VOLTAGE
100~150μSEC

3-12. PG SIGNAL TIMING CHART

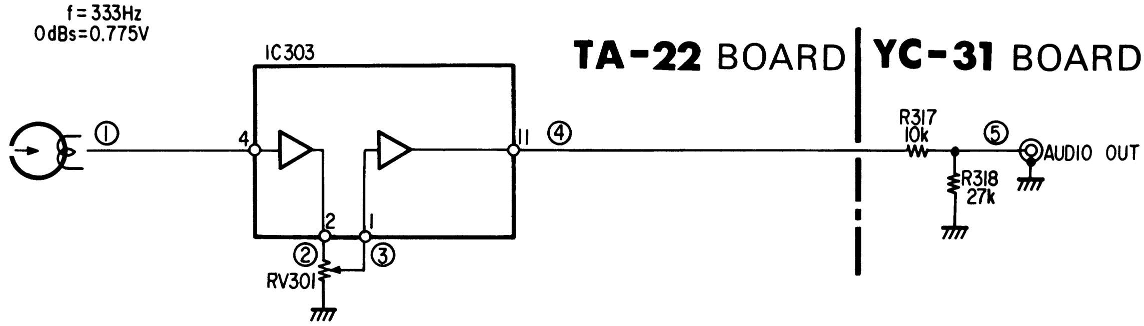

PG(A)
25Hz
30°
PG(S)
25Hz OFFSET
30° FROM PG A
PG(B)
25Hz
RF SW PULSE
PG A
PG B

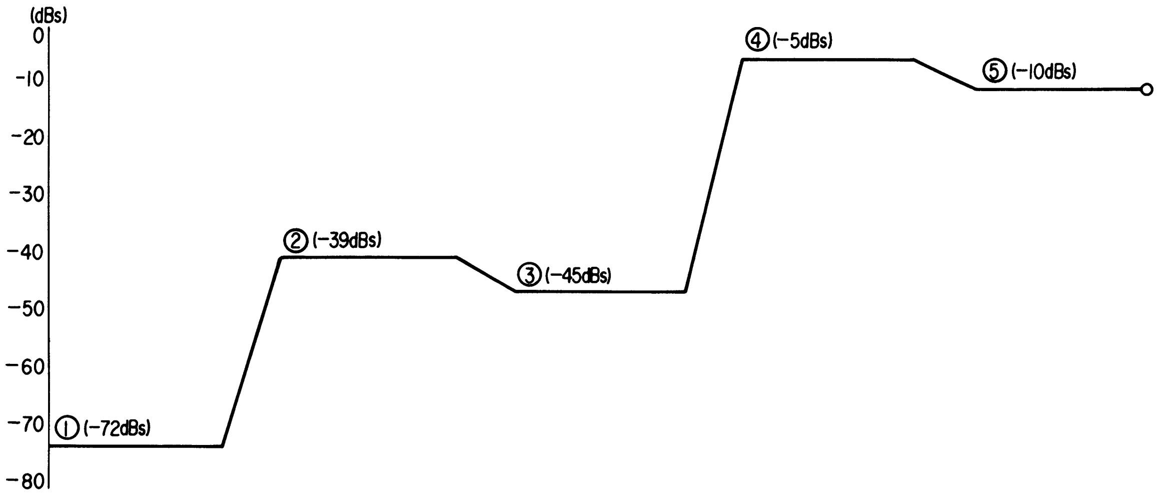
3-13. AUDIO LEVEL DIAGRAM (REC)


YC-31 BOARD
f = 333Hz
0dBs=0.775V
TA-22 BOARD
YC-31 BOARD
IC 301
IC 303
TUNER IN
AUDIO IN
① R302 100k
R303 1.2k
② R305 68k
R306 1.8k
2
7
4
③
18
LINE
BUFF
REC
PB
11
7
④
⑥
⑦
R317 10k
⑤
R318 27k
AUDIO OUT

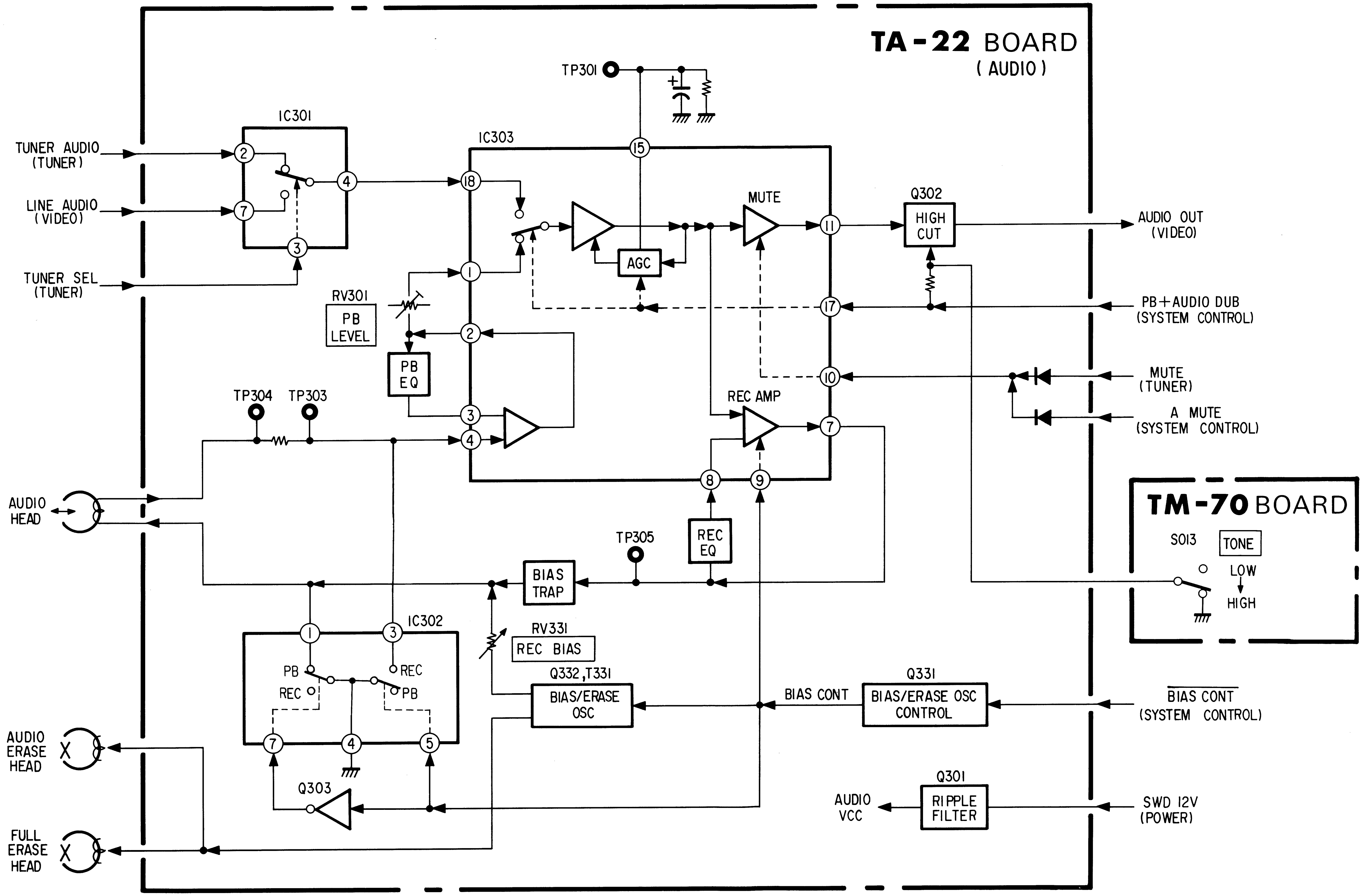


3-14. AUDIO LEVEL DIAGRAM (PB)

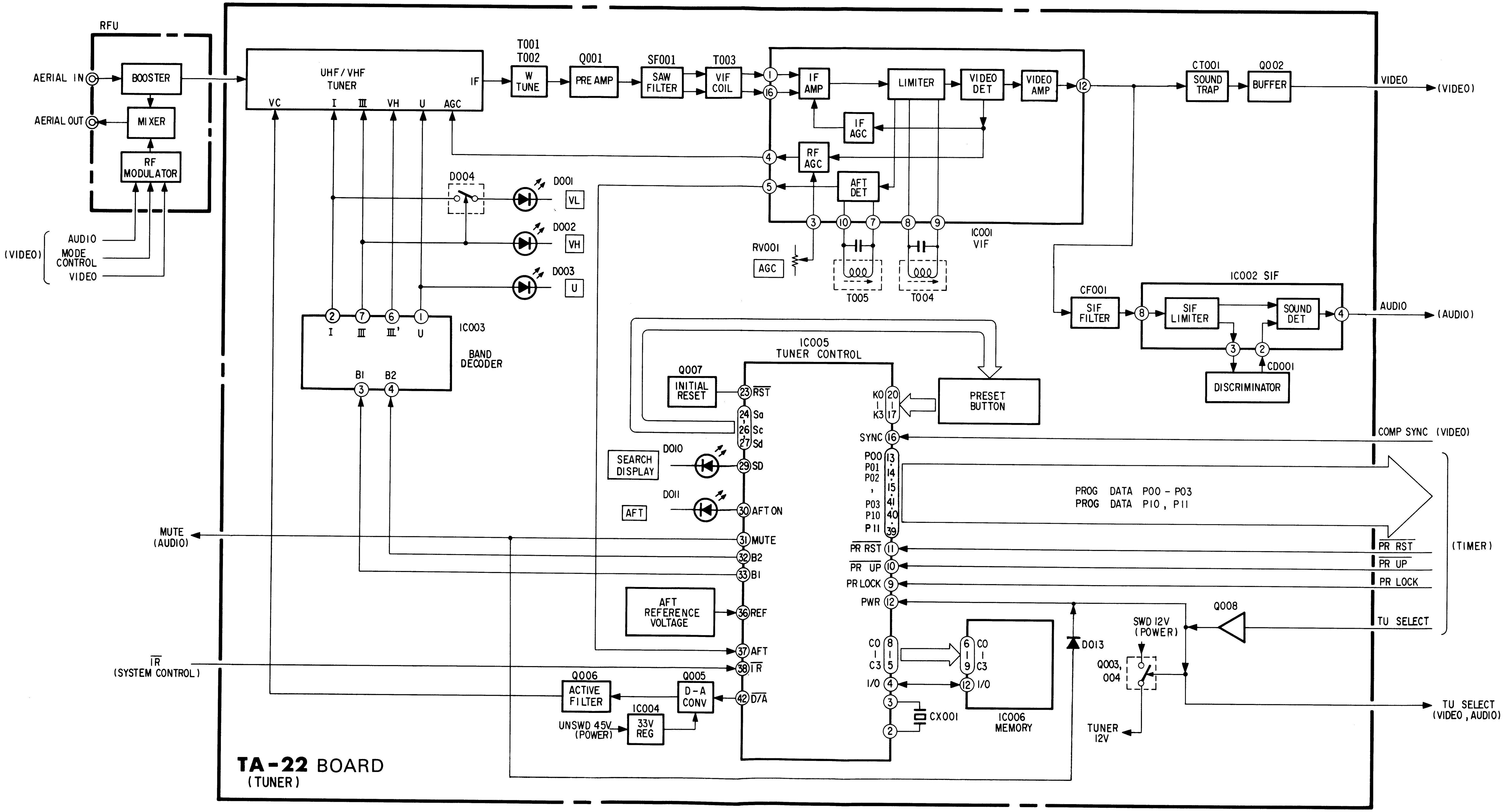

f = 333Hz
0dBs=0.775V
IC303
TA-22 BOARD
YC-31 BOARD
①
4
11
④
2
1
②
③
RV301
R317 10k
⑤
R318 27k
AUDIO OUT



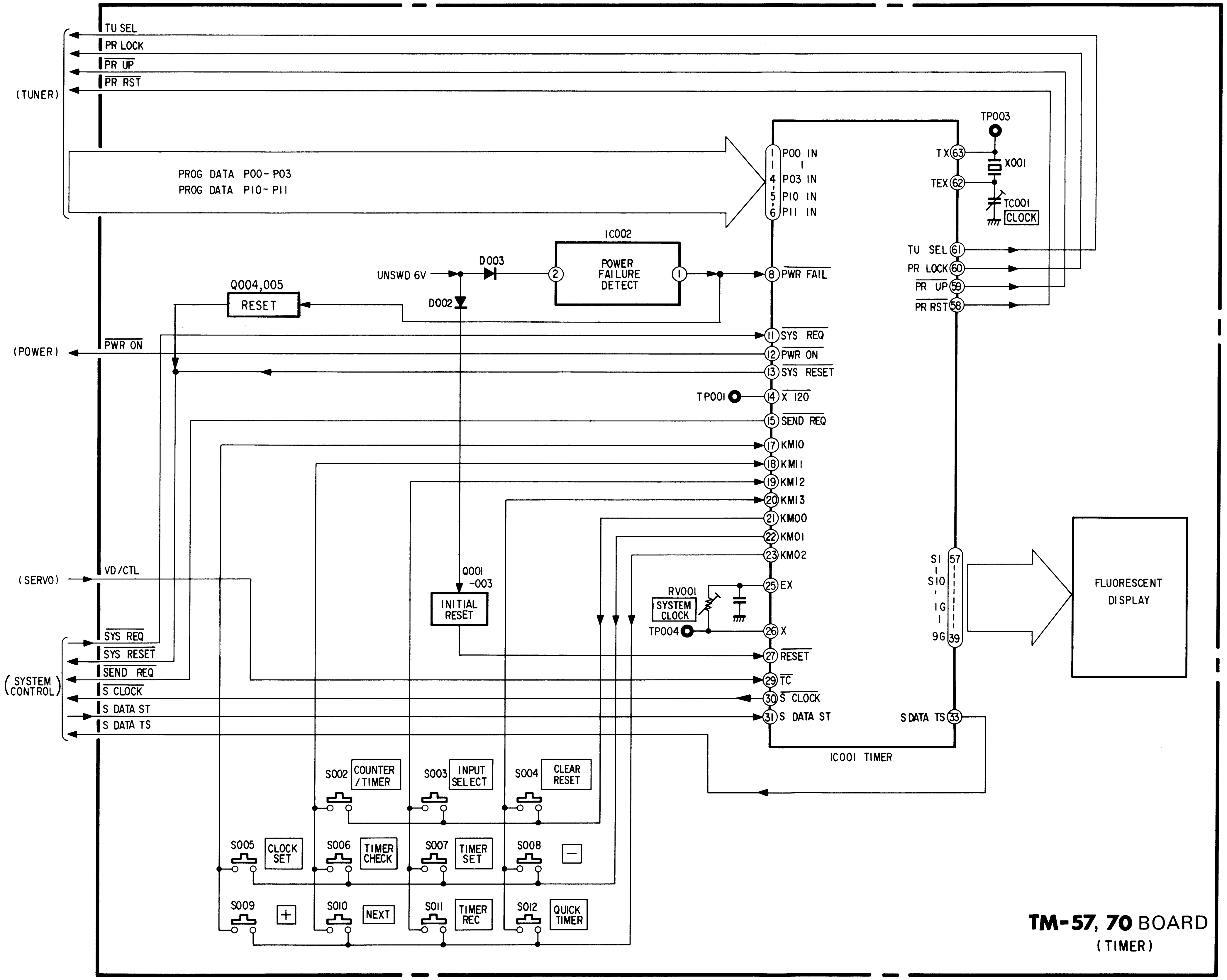
3-15. AUDIO BLOCK DIAGRAM


TA-22 BOARD
(AUDIO)
TP301
IC301
IC303
TUNER AUDIO
(TUNER)
LINE AUDIO
(VIDEO)
TUNER SEL
(TUNER)
MUTE
Q302
HIGH CUT
AGC
AUDIO OUT
(VIDEO)
PB+AUDIO DUB
(SYSTEM CONTROL)
RV301
PB LEVEL
PB EQ
MUTE
(TUNER)
A MUTE
(SYSTEM CONTROL)
TP304
TP303
REC AMP
AUDIO HEAD
TM-70 BOARD
S013
TONE
LOW
HIGH
TP305
REC EQ
BIAS TRAP
IC302
RV331
REC BIAS
PB
REC
REC
PB
Q332, T331
BIAS/ERASE OSC
BIAS CONT
Q331
BIAS/ERASE OSC CONTROL
BIAS CONT
(SYSTEM CONTROL)
AUDIO ERASE HEAD
Q303
Q301
AUDIO VCC
RIPPLE FILTER
SWD 12V
(POWER)
FULL ERASE HEAD

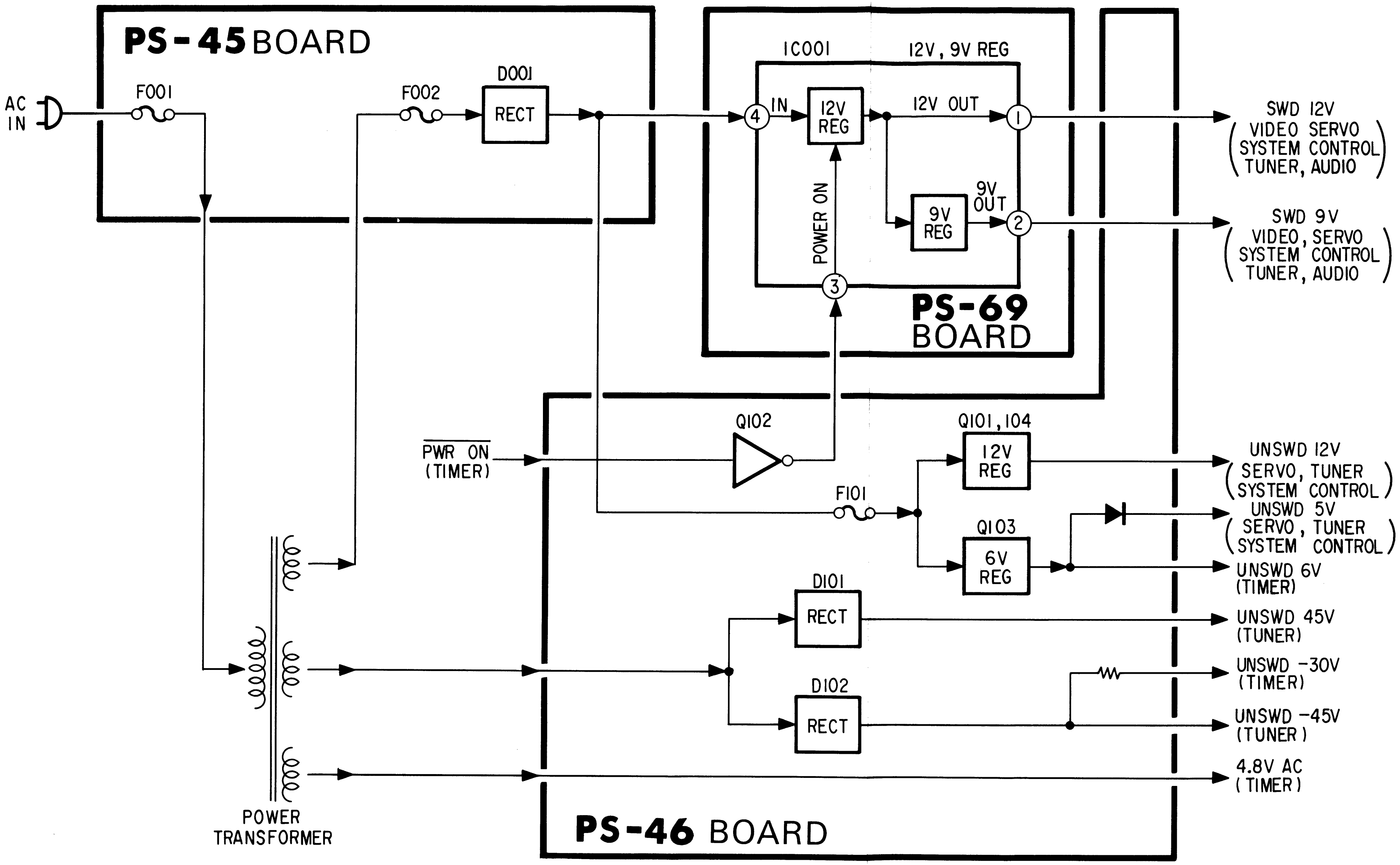
3-16. TUNER BLOCK DIAGRAM


RFU
AERIAL IN
AERIAL OUT
BOOSTER
MIXER
RF MODULATOR
(VIDEO)
AUDIO
MODE CONTROL
VIDEO
UHF/VHF TUNER
VC
I
III
VH
U
AGC
IF
T001
T002
W TUNE
Q001
PRE AMP
SF001
SAW FILTER
T003
VIF COIL
IF AMP
LIMITER
VIDEO DET
VIDEO AMP
IF AGC
RF AGC
AFT DET
IC001
VIF
RV001
AGC
T005
T004
D004
D001
VL
D002
VH
D003
U
IC003
BAND DECODER
I
III
III'
U
B1
B2
CT001
SOUND TRAP
Q002
BUFFER
VIDEO
(VIDEO)
CF001
SIF FILTER
IC002 SIF
SIF LIMITER
SOUND DET
CD001
DISCRIMINATOR
AUDIO
(AUDIO)
IC005
TUNER CONTROL
Q007
INITIAL RESET
RST
Sa
Sc
Sd
PRESET BUTTON
K0
K3
SEARCH DISPLAY
D010
SD
D011
AFT
AFT ON
MUTE
B2
B1
AFT REFERENCE VOLTAGE
REF
AFT
IR
D/A
SYNC
P00
P01
P02
P03
P10
P11
PROG DATA P00 - P03
PROG DATA P10, P11
COMP SYNC (VIDEO)
PR RST
PR UP
PR LOCK
PWR
TU SELECT
(TIMER)
Q008
SWD 12V (POWER)
D013
Q003, 004
TUNER 12V
TU SELECT (VIDEO, AUDIO)
C0
C3
I/O
CX001
IC006
MEMORY
MUTE (AUDIO)
IR (SYSTEM CONTROL)
Q006
ACTIVE FILTER
Q005
D-A CONV
IC004
33V REG
UNSWD 45V (POWER)
TA-22 BOARD
(TUNER)

3-17. TIMER BLOCK DIAGRAM

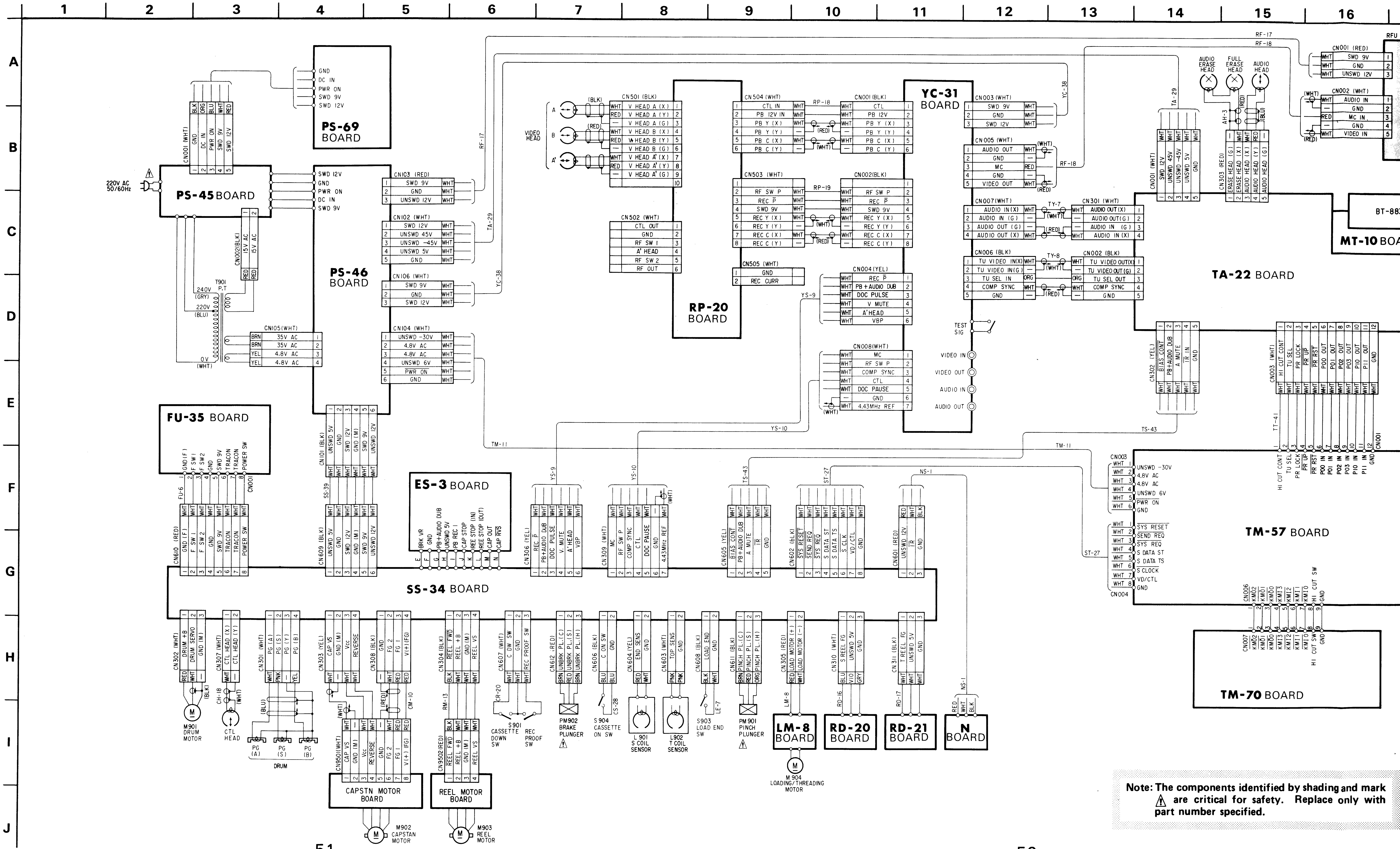

(TUNER)
TU SEL
PR LOCK
PR UP
PR RST
PROG DATA P00-P03
PROG DATA P10-P11
(POWER)
PWR ON
(SERVO)
VD/CTL
(SYSTEM CONTROL)
SYS REQ
SYS RESET
SEND REQ
S CLOCK
S DATA ST
S DATA TS
Q004,005
RESET
UNSWD 6V
D003
D002
IC002
POWER FAILURE DETECT
Q001 -003
INITIAL RESET
RV001
SYSTEM CLOCK
TP004
TP001
TP003
X001
TC001
CLOCK
P00 IN
P03 IN
P10 IN
P11 IN
PWR FAIL
SYS REQ
PWR ON
SYS RESET
X 120
SEND REQ
KMI0
KMI1
KMI2
KMI3
KMO0
KMO1
KMO2
EX
X
RESET
TC
S CLOCK
S DATA ST
TX
TEX
TU SEL
PR LOCK
PR UP
PR RST
S1 - S10 , 1G - 9G
S DATA TS
IC001 TIMER
FLUORESCENT DISPLAY
S002 COUNTER /TIMER
S003 INPUT SELECT
S004 CLEAR RESET
S005 CLOCK SET
S006 TIMER CHECK
S007 TIMER SET
S008 −
S009 +
S010 NEXT
S011 TIMER REC
S012 QUICK TIMER
TM-57, 70 BOARD
(TIMER)

3-18. POWER BLOCK DIAGRAM


PS-45 BOARD
AC IN
F001
F002
D001
RECT
IC001
12V, 9V REG
IN
12V REG
12V OUT
POWER ON
9V REG
9V OUT
4
1
2
3
PS-69 BOARD
SWD 12V
(VIDEO SERVO SYSTEM CONTROL TUNER, AUDIO)
SWD 9V
(VIDEO, SERVO SYSTEM CONTROL TUNER, AUDIO)
PWR ON (TIMER)
Q102
Q101, 104
12V REG
F101
Q103
6V REG
UNSWD 12V
(SERVO, TUNER SYSTEM CONTROL)
UNSWD 5V
(SERVO, TUNER SYSTEM CONTROL)
UNSWD 6V (TIMER)
D101
RECT
UNSWD 45V (TUNER)
UNSWD -30V (TIMER)
D102
RECT
UNSWD -45V (TUNER)
4.8V AC (TIMER)
POWER TRANSFORMER
PS-46 BOARD

SECTION 4
SCHEMATIC DIAGRAM AND PRINTED WIRING BOARDS

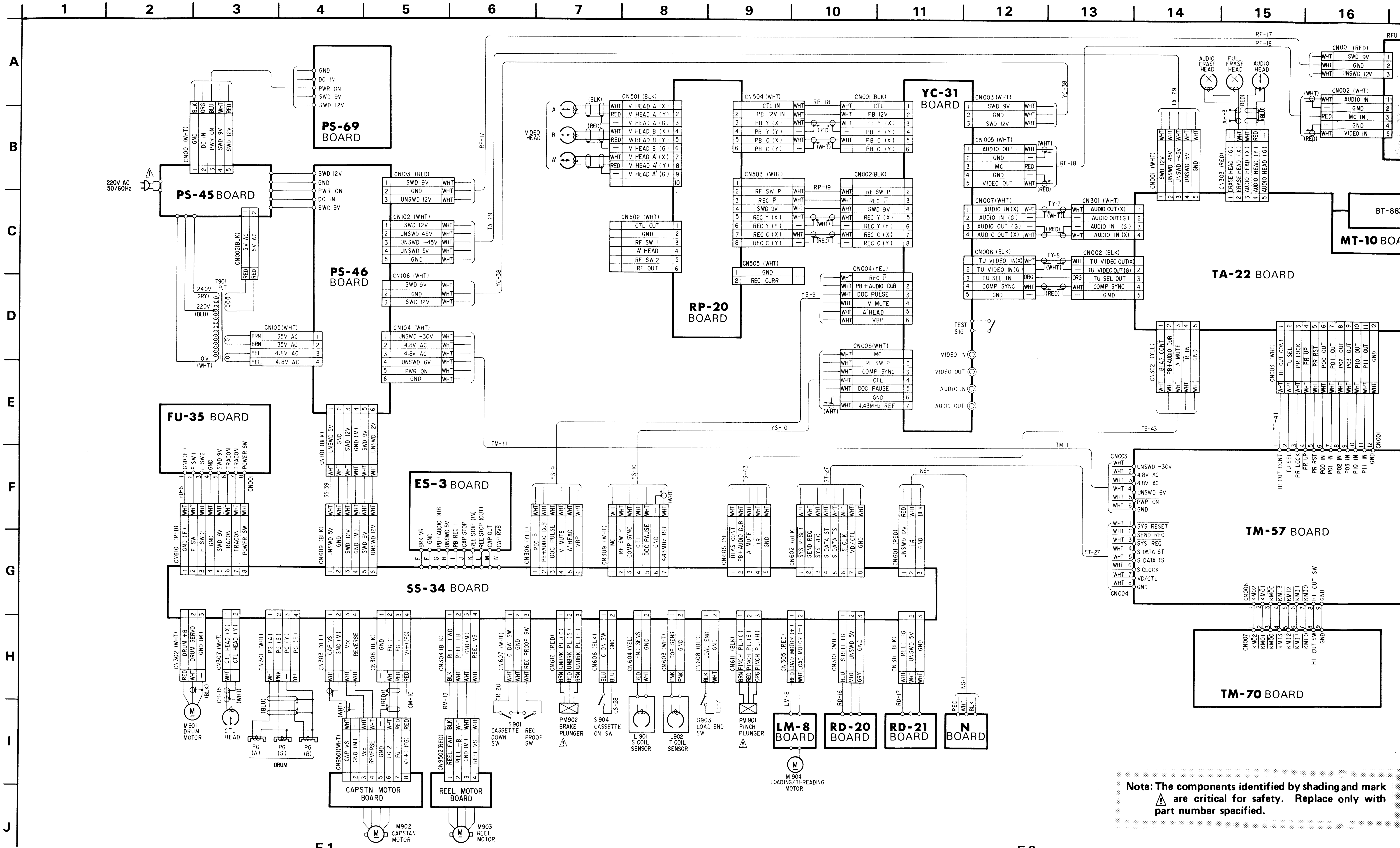
4-1. FRAME SCHEMATIC DIAGRAM


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A B C D E F G H I J
PS-69 BOARD
GND
DC IN
PWR ON
SWD 9V
SWD 12V
CN001 (WHT)
PS-45 BOARD
220V AC 50/60Hz
CN002 (BLK)
15V AC
T901 P.T
240V (GRY)
220V (BLU)
0V (WHT)
CN105 (WHT)
35V AC
4.8V AC
PS-46 BOARD
CN103 (RED)
CN102 (WHT)
CN106 (WHT)
CN104 (WHT)
UNSWD -30V
UNSWD 45V
UNSWD -45V
UNSWD 5V
UNSWD 6V
UNSWD 12V
PWR ON
FU-35 BOARD
CN101 (BLK)
RF-17
RF-18
TA-29
YC-38
VIDEO HEAD
CN501 (BLK)
V HEAD A (X)
V HEAD A (Y)
V HEAD A (G)
V HEAD B (X)
V HEAD B (Y)
V HEAD B (G)
V HEAD A' (X)
V HEAD A' (Y)
V HEAD A' (G)
CN502 (WHT)
CTL OUT
RF SW 1
A' HEAD
RF SW 2
RF OUT
RP-20 BOARD
CN504 (WHT)
CN503 (WHT)
CN505 (WHT)
REC CURR
RP-18
RP-19
YC-31 BOARD
CN001 (BLK)
CN002 (BLK)
CN003 (WHT)
CN004 (YEL)
CN005 (WHT)
CN006 (BLK)
CN007 (WHT)
CN008 (WHT)
PB 12V
PB Y (X)
PB Y (Y)
PB C (X)
PB C (Y)
RF SW P
REC Y (X)
REC Y (Y)
REC C (X)
REC C (Y)
PB+AUDIO DUB
DOC PULSE
V MUTE
A' HEAD
VBP
MC
COMP SYNC
CTL
DOC PAUSE
4.43MHz REF
AUDIO OUT
AUDIO IN (X)
AUDIO IN (G)
AUDIO OUT (G)
AUDIO OUT (X)
TU VIDEO IN (X)
TU VIDEO IN (G)
TU SEL IN
TEST SIG
VIDEO IN
VIDEO OUT
AUDIO IN
AUDIO OUT
YS-9
YS-10
TY-7
TY-8
CN301 (WHT)
CN002 (BLK)
TA-22 BOARD
AUDIO ERASE HEAD
FULL ERASE HEAD
AUDIO HEAD
AH-3
CN303 (RED)
ERASE HEAD (G)
ERASE HEAD (X)
AUDIO HEAD (X)
AUDIO HEAD (Y)
AUDIO HEAD (G)
RFU
CN001 (RED)
CN002 (WHT)
VIDEO IN
MC IN
BT-883
MT-10 BOARD
CN302 (YEL)
BIAS CONT
A MUTE
TR IN
CN003 (WHT)
HI CUT CONT
TU SEL
PR LOCK
PR UP
PR RST
TT-41
TS-43
TM-11
ST-27
NS-1
TM-57 BOARD
CN003
CN004
SYS RESET
SEND REQ
SYS REQ
S DATA ST
S DATA TS
S CLOCK
VD/CTL
CN006
CN007
TM-70 BOARD
ES-3 BOARD
BRK VR
REE STOP (IN)
REE STOP (OUT)
CAP OUT
CAP RVS
SS-34 BOARD
CN610 (RED)
CN609 (BLK)
CN306 (YEL)
CN309 (WHT)
CN605 (YEL)
CN602 (BLK)
CN601 (RED)
FU-6
SS-39
CN302 (WHT)
DRUM +B
DRUM SERVO
CN307 (WHT)
CTL HEAD (X)
CTL HEAD (Y)
CN301 (WHT)
PG (A)
PG (S)
PG (Y)
PG (B)
CN303 (YEL)
CAP VS
REVERSE
CN308 (BLK)
FG 2
FG 1
V (+) (FG)
CN304 (BLK)
REEL FWD
REEL +B
REEL VS
CN607 (WHT)
C DW SW
REC PROOF SW
CN612 (RED)
UNBRK PL (C)
UNBRK PL (S)
UNBRK PL (H)
CN606 (BLK)
C ON SW
CN604 (YEL)
END SENS
CN603 (WHT)
TOP SENS
CN608 (BLK)
LOAD END
CN611 (BLK)
PINCH PL (C)
PINCH PL (S)
PINCH PL (H)
CN305 (RED)
LOAD MOTOR (+)
LOAD MOTOR (-)
CN310 (WHT)
S REEL FG
CN311 (BLK)
T REEL FG
M901 DRUM MOTOR
CH-18
CTL HEAD
DRUM
CM-10
RM-13
CN9501 (WHT)
CN9502 (RED)
CAPSTN MOTOR BOARD
REEL MOTOR BOARD
M902 CAPSTAN MOTOR
M903 REEL MOTOR
CR-20
S901 CASSETTE DOWN SW
REC PROOF SW
PM902 BRAKE PLUNGER
S904 CASSETTE ON SW
CS-28
L901 S COIL SENSOR
L902 T COIL SENSOR
S903 LOAD END SW
LE-7
PM901 PINCH PLUNGER
LM-8
LM-8 BOARD
M904 LOADING/THREADING MOTOR
RD-16
RD-20 BOARD
RD-17
RD-21 BOARD
N BOARD

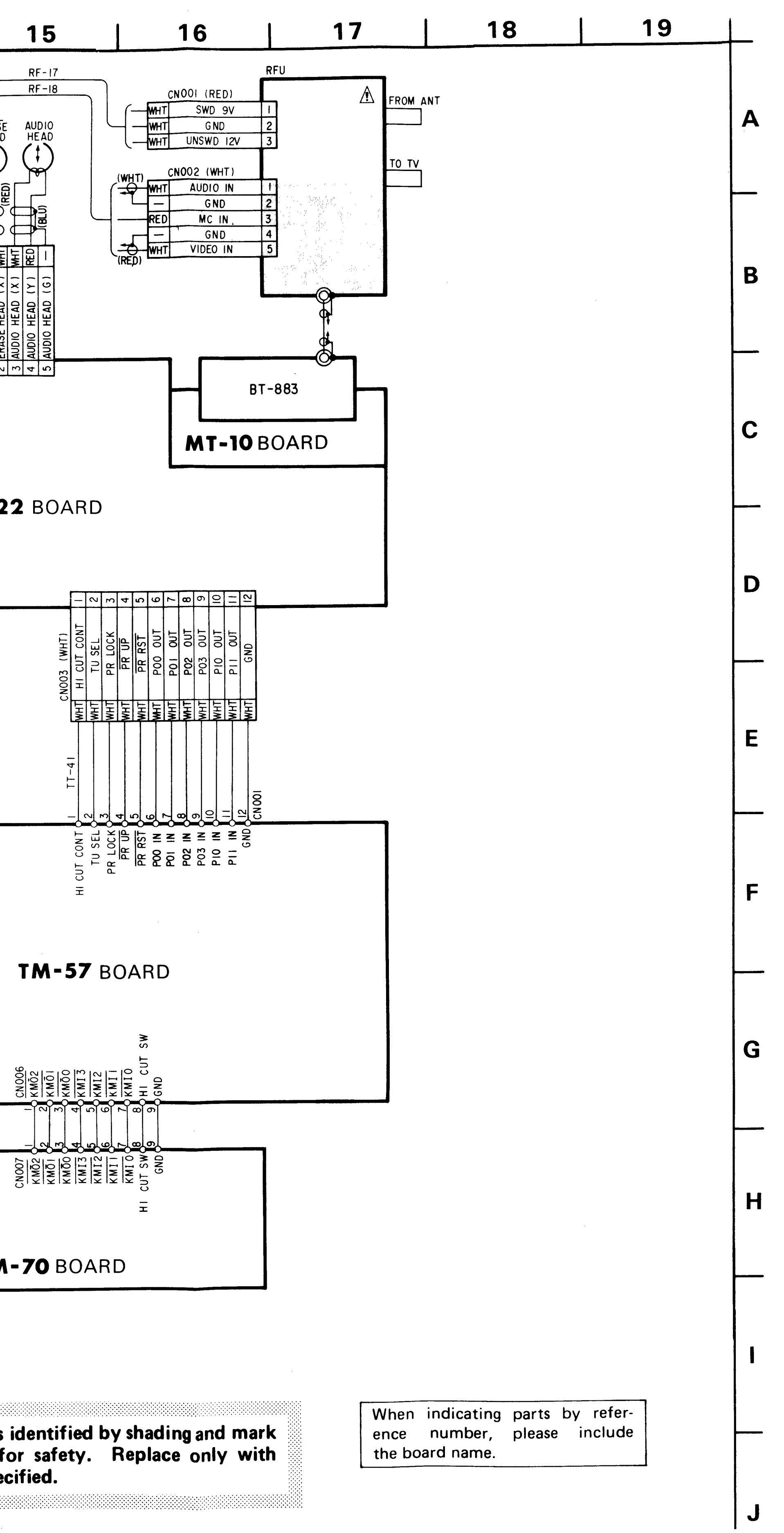
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SECTION 4
SCHEMATIC DIAGRAM AND PRINTED WIRING BOARDS

4-1. FRAME SCHEMATIC DIAGRAM


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A B C D E F G H I J
PS-69 BOARD
PS-45 BOARD
220V AC 50/60Hz
T901 P.T
PS-46 BOARD
FU-35 BOARD
ES-3 BOARD
SS-34 BOARD
RP-20 BOARD
YC-31 BOARD
TA-22 BOARD
MT-10 BOARD
BT-88
TM-57 BOARD
TM-70 BOARD
VIDEO HEAD
AUDIO ERASE HEAD
FULL ERASE HEAD
AUDIO HEAD
TEST SIG
VIDEO IN
VIDEO OUT
AUDIO IN
AUDIO OUT
M901 DRUM MOTOR
CTL HEAD
PG (A) PG (S) PG (B)
DRUM
CAPSTN MOTOR BOARD
M902 CAPSTAN MOTOR
REEL MOTOR BOARD
M903 REEL MOTOR
S901 CASSETTE DOWN SW
REC PROOF SW
PM902 BRAKE PLUNGER
S904 CASSETTE ON SW
L901 S COIL SENSOR
L902 T COIL SENSOR
S903 LOAD END SW
PM901 PINCH PLUNGER
LM-8 BOARD
M904 LOADING/THREADING MOTOR
RD-20 BOARD
RD-21 BOARD
N BOARD

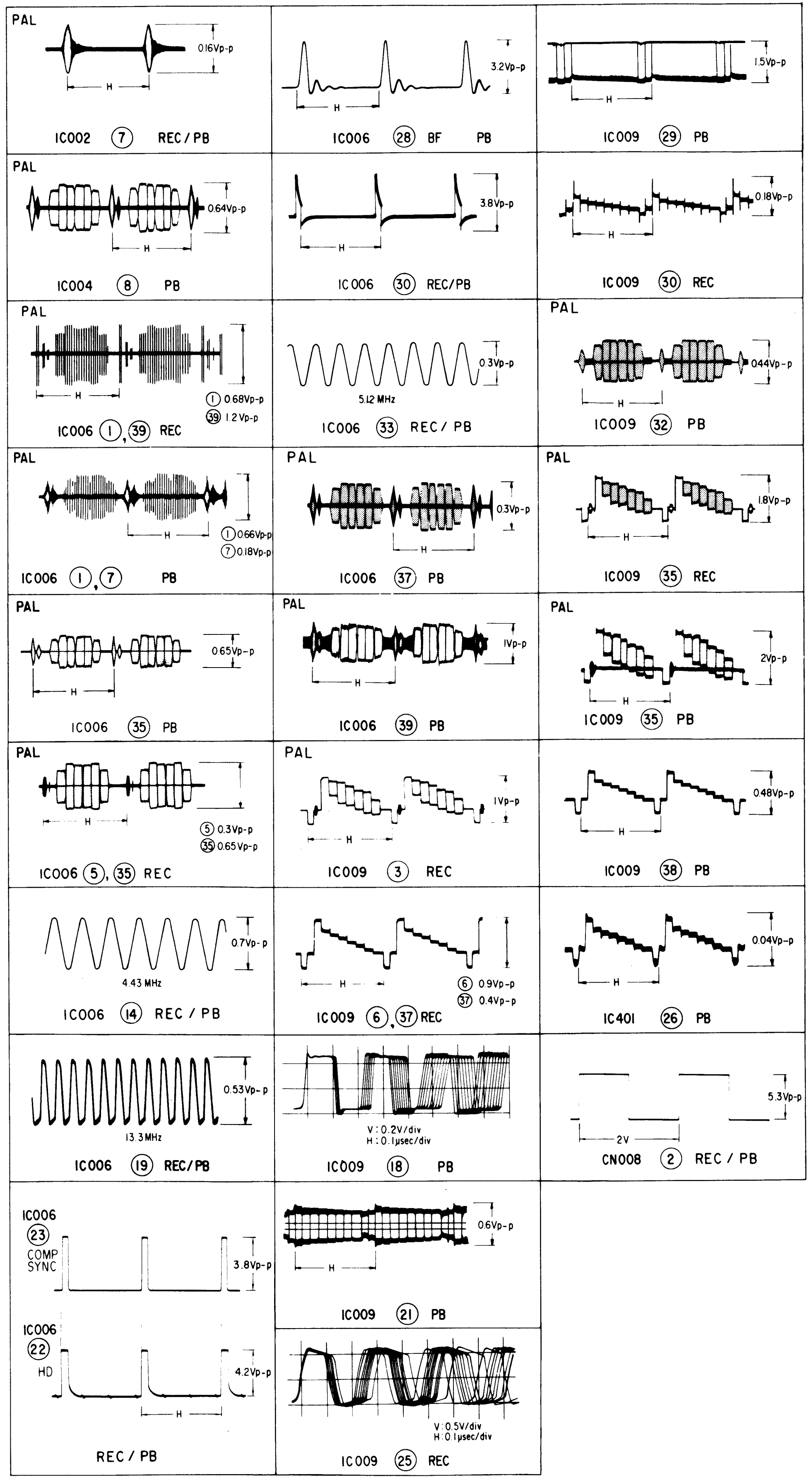
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.


15
16
17
18
19
A
B
C
D
E
F
G
H
I
J
RF-17
RF-18
RFU
CN001 (RED)
WHT SWD 9V 1
WHT GND 2
WHT UNSWD 12V 3
FROM ANT
TO TV
CN002 (WHT)
WHT AUDIO IN 1
— GND 2
RED MC IN 3
— GND 4
WHT VIDEO IN 5
(WHT)
(RED)
(BLU)
AUDIO HEAD
ERASE HEAD
AUDIO HEAD (X)
AUDIO HEAD (Y)
AUDIO HEAD (G)
BT-883
MT-10 BOARD
22 BOARD
CN003 (WHT)
HI CUT CONT
TU SEL
PR LOCK
PR UP
PR RST
P00 OUT
P01 OUT
P02 OUT
P03 OUT
P10 OUT
P11 OUT
GND
TT-41
CN001
HI CUT CONT
TU SEL
PR LOCK
PR UP
PR RST
P00 IN
P01 IN
P02 IN
P03 IN
P10 IN
P11 IN
GND
TM-57 BOARD
CN006
KM02
KM01
KM00
KMI3
KMI2
KMI1
KMI0
HI CUT SW
GND
CN007
KM02
KM01
KM00
KMI3
KMI2
KMI1
KMI0
HI CUT SW
GND
-70 BOARD

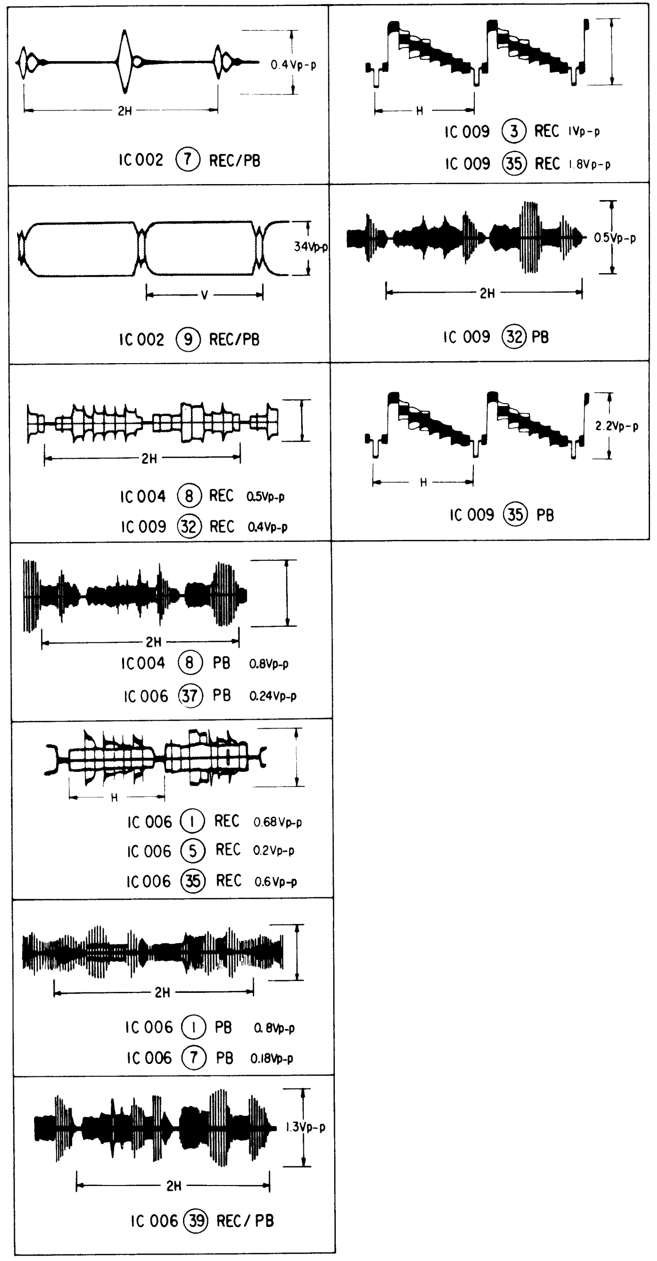
s identified by shading and mark
for safety. Replace only with
ecified.

When indicating parts by reference number, please include the board name.

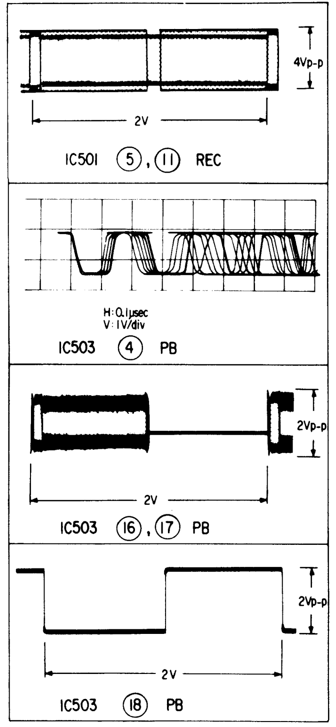
YC-31 BOARD (PAL/SECAM)



YC-31 BOARD (SECAM)



RP-20 BOARD

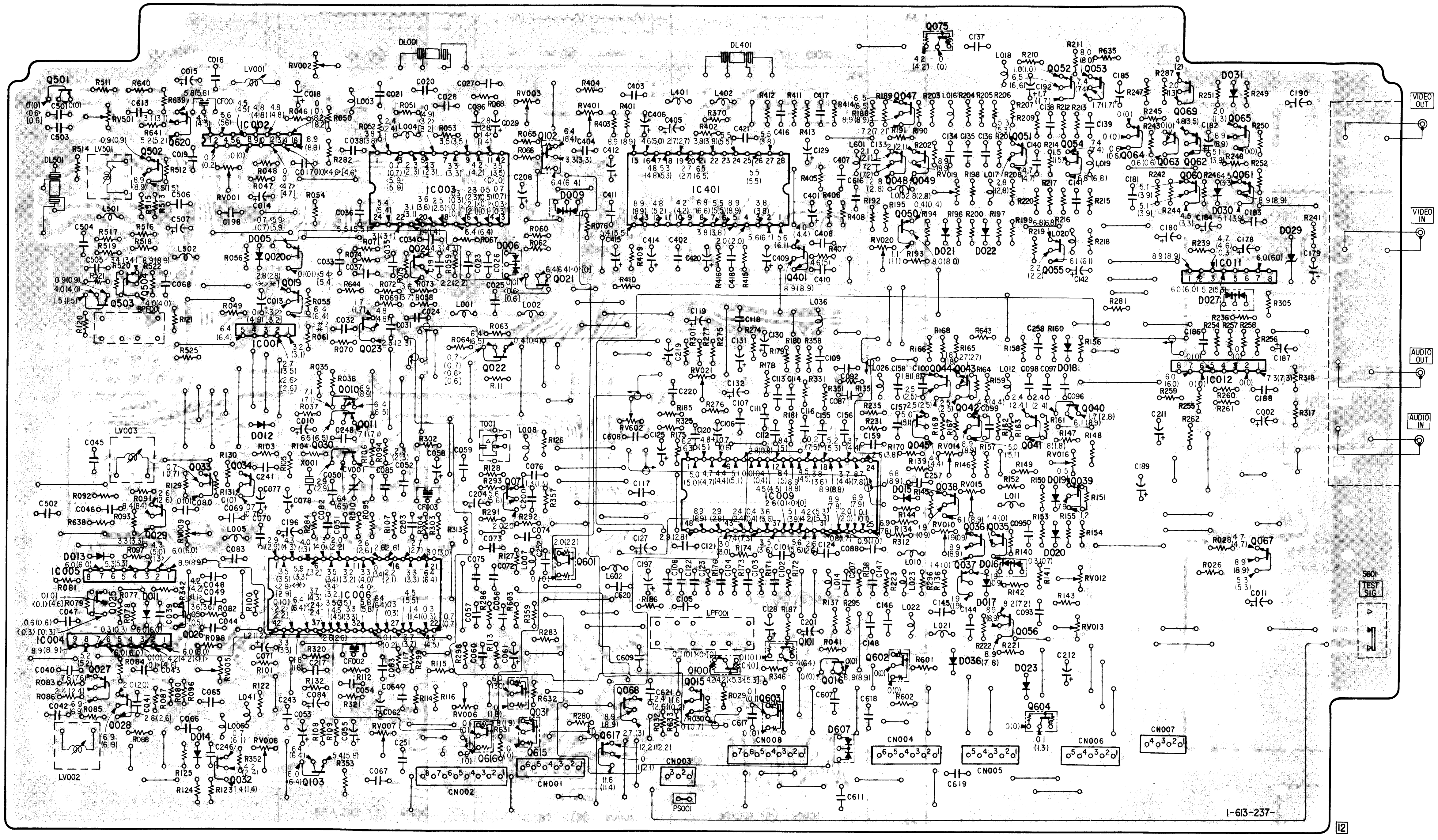


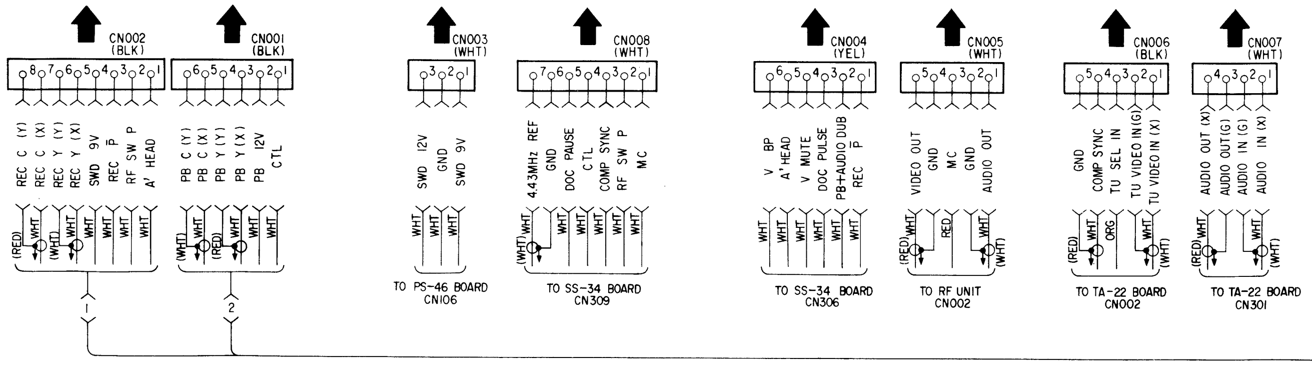
4-2. YC-31 (Y, CHROMA SIGNAL PROCESS), RP-20 (VIDEO SIGNAL, REC/PB AMP) PRINTED WIRING BOARDS

– Ref. No. YC-31 BOARD : 1000 series, RP-20 BOARD : 2000 series –

	Q , IC	D	ADJ
A	075 052,053 069		RV002
B	501 047 620 064,065 063,062 IC002 051,054 102,048,049 502 IC003 060,061 IC401	031 030	LV001 RV003 RV401 RV501 RV001 LV501 RV019
C	050 055 020, 401 024 IC011 021 504 503,019	009 021,022 005 006 029 027	RV020
D	023 IC001 022 IC012 044,043 010 045 040 011 042,041	018	RV021 RV602
E	030 033,034 IC009 039 071,038 029 035	012 019 015 020	RV014 LV003 RV016 CV001 RV015 RV009 RV010
F	036 067 601 IC005 037 025 026 IC004 056	013 016 017 011	RV012 RV013
G	101 100 602 016 027 031 015 028 068 603 616 615 604 617 103 032	036 023 607 014	RV005 RV006 RV007 LV002 RV008
H			
	Q , IC	D	ADJ

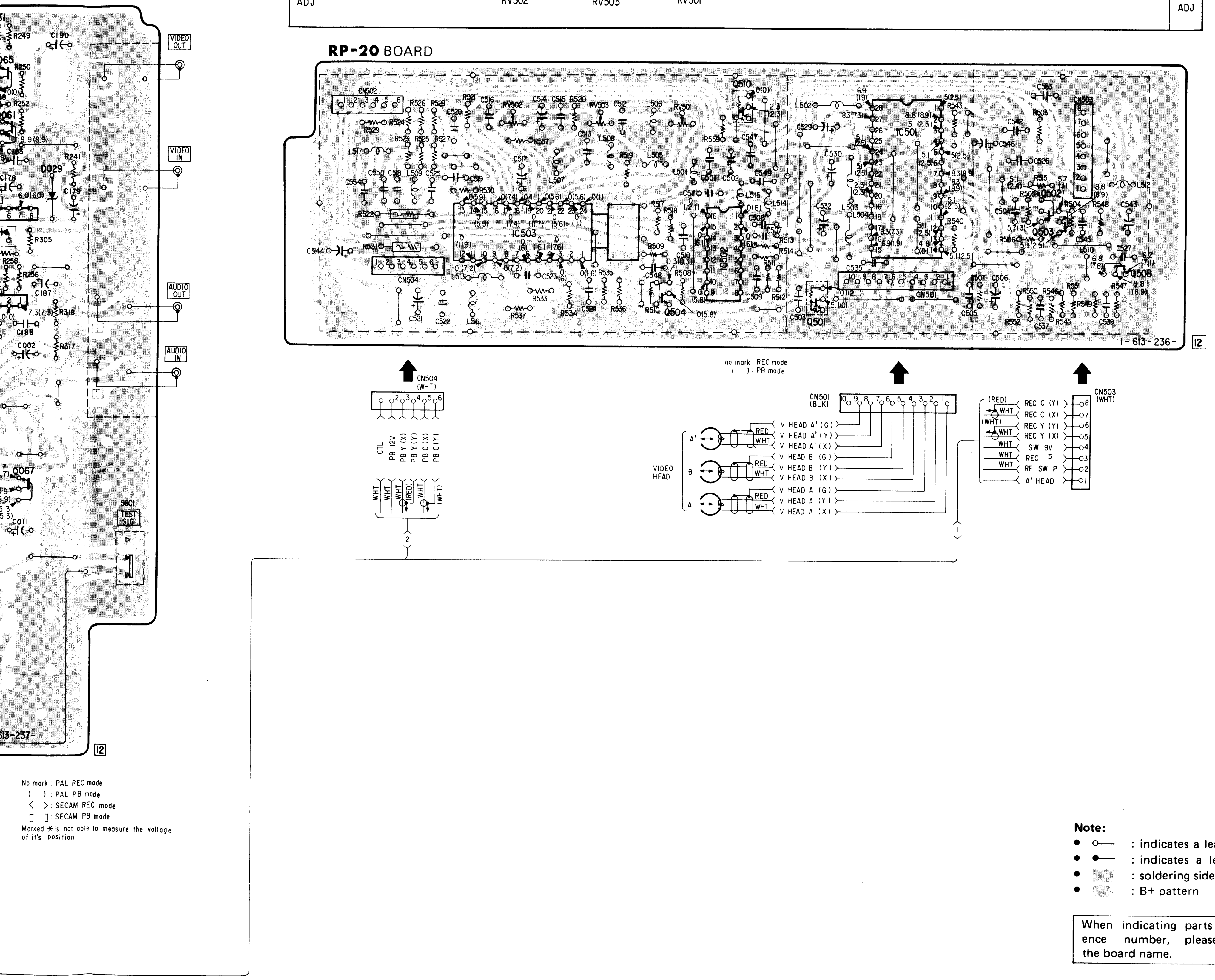
YC-31 BOARD


1-613-237-
12
VIDEO OUT
VIDEO IN
AUDIO OUT
AUDIO IN
S601 TEST SIG
CN001
CN002
CN003
CN004
CN005
CN006
CN007
CN008
PS001
DL001
DL401
IC001
IC002
IC003
IC401
IC004
IC005
IC006
IC009
IC011
IC012


CN002 (BLK)
REC C (Y)
REC C (X)
REC Y (Y)
REC Y (X)
SWD 9V
REC P̄
RF SW P
A' HEAD
CN001 (BLK)
PB C (Y)
PB C (X)
PB Y (Y)
PB Y (X)
PB 12V
CTL
1
2
CN003 (WHT)
SWD 12V
GND
SWD 9V
TO PS-46 BOARD CN106
CN008 (WHT)
4.43MHz REF
GND
DOC PAUSE
CTL
COMP SYNC
RF SW P
MC
TO SS-34 BOARD CN309
CN004 (YEL)
V BP
A' HEAD
V MUTE
DOC PULSE
PB+AUDIO DUB
REC P̄
TO SS-34 BOARD CN306
CN005 (WHT)
VIDEO OUT
GND
MC
GND
AUDIO OUT
TO RF UNIT CN002
CN006 (BLK)
GND
COMP SYNC
TU SEL IN
TU VIDEO IN (G)
TU VIDEO IN (X)
TO TA-22 BOARD CN002
CN007 (WHT)
AUDIO OUT (X)
AUDIO OUT (G)
AUDIO IN (G)
AUDIO IN (X)
TO TA-22 BOARD CN301
WHT
RED
ORG

No mark : PAL REC mode
( ) : PAL PB mode
< > : SECAM REC mode
[ ] : SECAM PB mode
Marked ✱ is not able to measure the voltage of it's position

	18	19	20	21	22	23	24	
Q IC		IC503	504	IC502 510	501	IC501	502 503 508	Q IC
ADJ		RV502	RV503	RV501				ADJ


RP-20 BOARD
VIDEO OUT
VIDEO IN
AUDIO OUT
AUDIO IN
S601
TEST SIG
1-613-236-
613-237-
12
CN502
CN504
CN501
CN503
IC501
IC502
IC503
Q501
Q502
Q503
Q504
Q508
Q510
no mark : REC mode
( ) : PB mode
CN504 (WHT)
CTL
PB 12V
PB Y (X)
PB Y (Y)
PB C (X)
PB C (Y)
WHT
WHT
WHT
(RED)
WHT
(WHT)
CN501 (BLK)
VIDEO HEAD
A'
B
A
V HEAD A' (G)
V HEAD A' (Y)
V HEAD A' (X)
V HEAD B (G)
V HEAD B (Y)
V HEAD B (X)
V HEAD A (G)
V HEAD A (Y)
V HEAD A (X)
RED
WHT
CN503 (WHT)
(RED)
(WHT)
REC C (Y)
REC C (X)
REC Y (Y)
REC Y (X)
SW 9V
REC P̄
RF SW P
A' HEAD

No mark : PAL REC mode
( ) : PAL PB mode
< > : SECAM REC mode
[ ] : SECAM PB mode
Marked ✱ is not able to measure the voltage of it's position

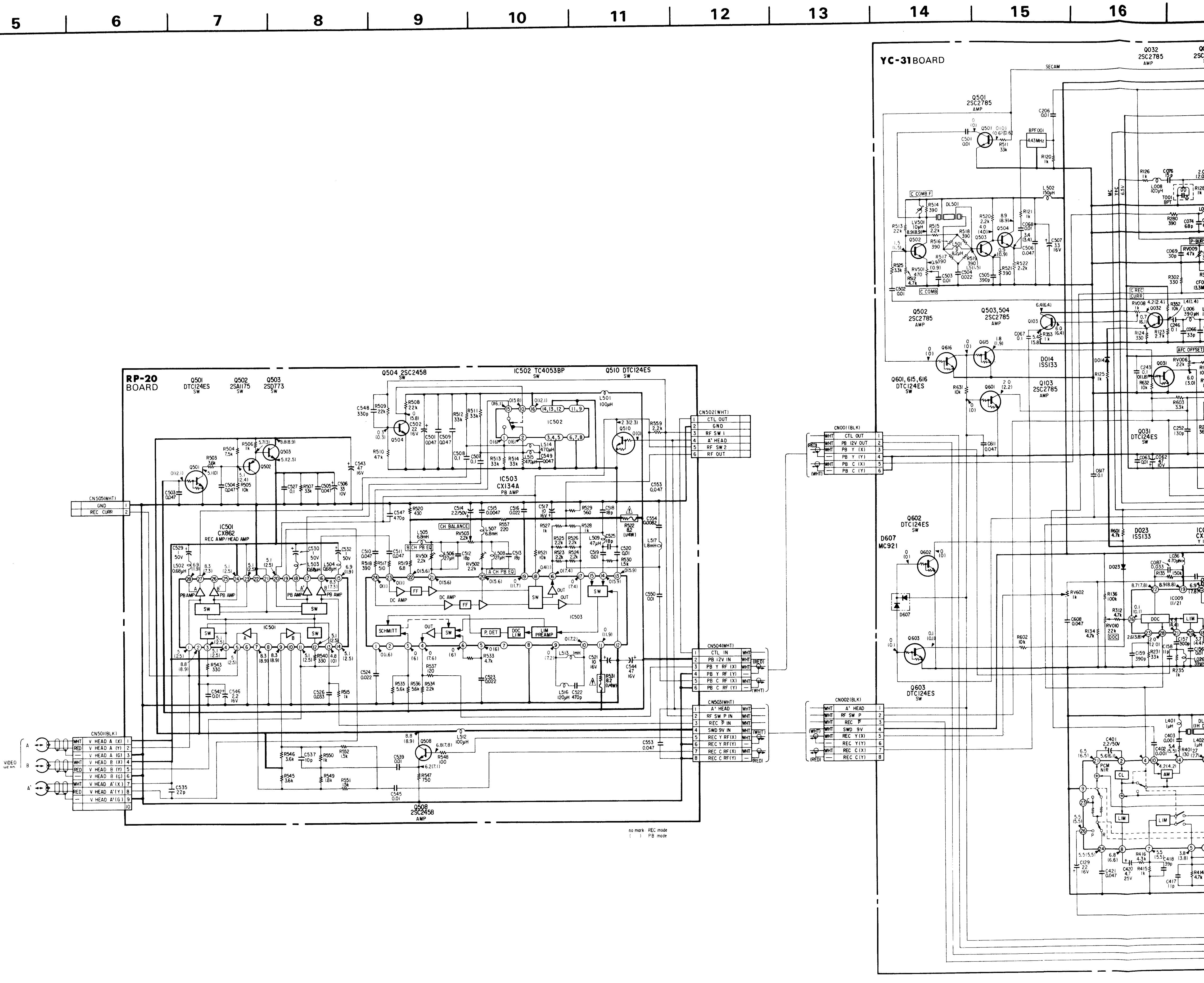
Note:

- ○— : indicates a lead wire mounted on the component side.
- ●— : indicates a lead wire mounted on the printed side.
- ▨ : soldering side
- ░ : B+ pattern

When indicating parts by reference number, please include the board name.

YC-31 (Y, CHROMA SIGNAL PROCESS), RP-20 (VIDEO SIGNAL, REC/PB AMP) SCHEMATIC DIAGRAM

– Ref. No. YC-31 BOARD : 1000 series, RP-20 BOARD : 2000 series –



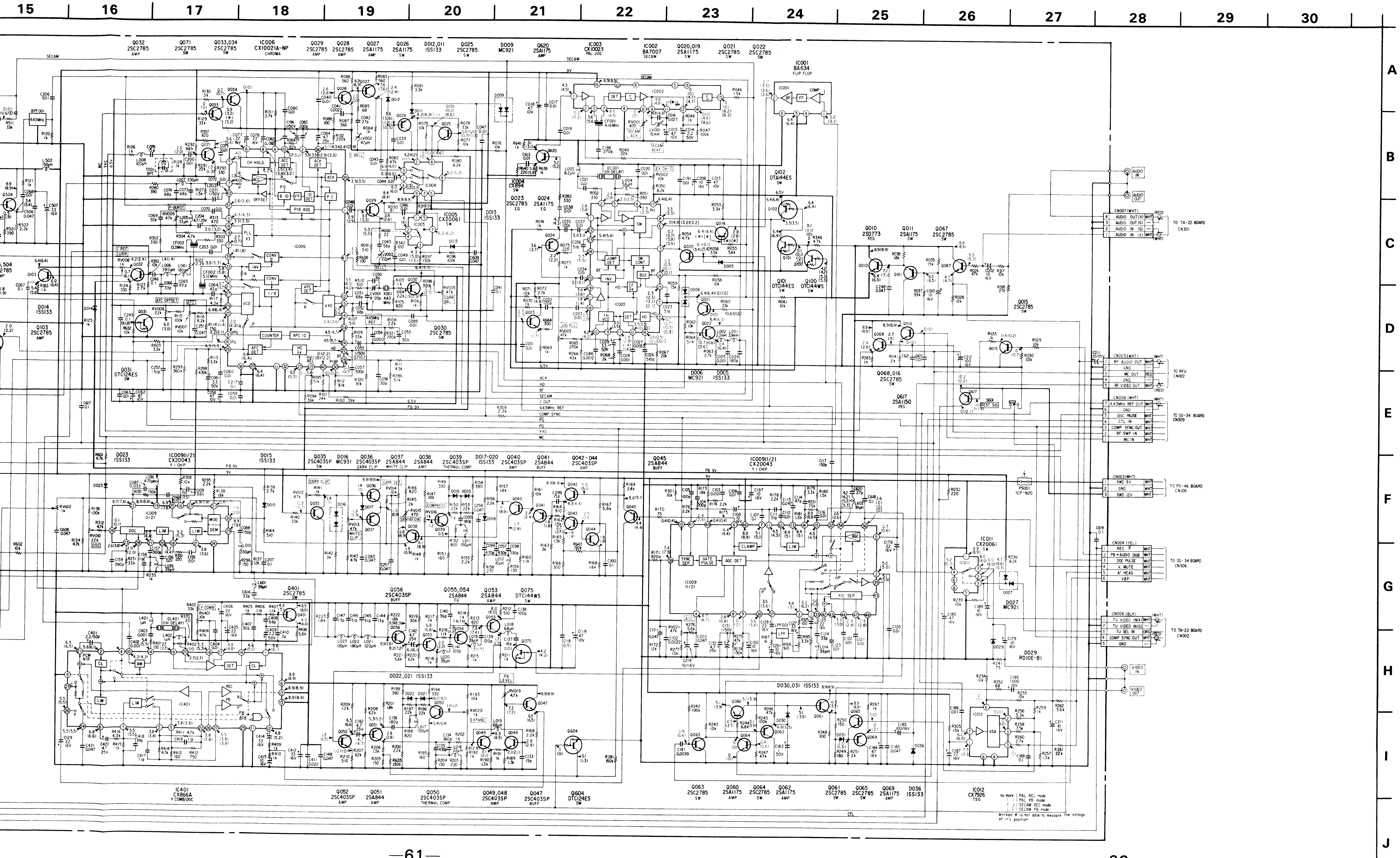
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
A
B
C
D
E
F
G
H
I
J
RP-20 BOARD
Q501 DTC124ES SW
Q502 2SA1175 SW
Q503 2SD773 SW
Q504 2SC2458 SW
IC502 TC4053BP SW
Q510 DTC124ES SW
IC501 CX862 REC AMP/HEAD AMP
IC503 CX134A PB AMP
Q508 2SC2458 AMP
CN505(WHT)
GND
REC CURR
CN501(BLK)
V HEAD A (X)
V HEAD A (Y)
V HEAD A (G)
V HEAD B (G)
V HEAD B (Y)
V HEAD B (X)
V HEAD A' (X)
V HEAD A' (Y)
V HEAD A' (G)
VIDEO HEAD
CN502(WHT)
CTL OUT
GND
RF SW 1
A' HEAD
RF SW 2
RF OUT
CN504(WHT)
CTL IN
PB 12V IN
PB Y RF (X)
PB Y RF (Y)
PB C RF (X)
PB C RF (Y)
CN503(WHT)
A' HEAD
RF SW P IN
REC P IN
SWD 9V IN
REC Y RF(X)
REC Y RF(Y)
REC C RF(X)
REC C RF(Y)
CH BALANCE
SCHMITT
P. DET
DOC LIM
LIM PREAMP
PB AMP
SW
DC AMP
FF
no mark : REC mode
( ) : PB mode
YC-31 BOARD
Q032 2SC2785 AMP
Q501 2SC2785 AMP
Q502 2SC2785 AMP
Q503,504 2SC2785 AMP
Q601, 615, 616 DTC124ES SW
D014 1SS133
Q103 2SC2785 AMP
Q031 DTC124ES SW
CN001(BLK)
CTL OUT
PB 12V OUT
PB Y (X)
PB Y (Y)
PB C (X)
PB C (Y)
CN002(BLK)
A' HEAD
RF SW P
REC P
SWD 9V
REC Y (X)
REC Y (Y)
REC C (X)
REC C (Y)
Q602 DTC124ES SW
D607 MC921
Q603 DTC124ES SW
D023 1SS133
SECAM
C COMB F
C COMB
C REC CURR
AFC OFFSET
DOC
LIM
CL
AM
PCM NIR

Note:

- All resistors are in ohms, 1/6W unless otherwise noted.
- All capacitors are in μF (p:pF) unless otherwise noted. 50V or less are not indicated except for electrolytic capacitors.
- All variable and semi-fixed resistors have characteristic curve B, unless otherwise noted.
- ▭ : Nonflammable resistor
- ▭ : Fusible resistor
- ——— : B+ bus.
- The voltage value is reference value between the grounding when the color bar signal is received from a color bar generator.
- The voltage value is measured using a digital tester (10MΩ).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.


15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
A
B
C
D
E
F
G
H
I
J
Q032 2SC2785 AMP
Q071 2SC2785 SW
Q033,034 2SC2785 SW
IC006 CX10021A-NP CHROMA
Q029 2SC2785 AMP
Q028 2SC2785 AMP
Q027 2SA1175 AMP
Q026 2SA1175 SW
D012,011 ISS133
Q025 2SC2785 SW
D009 MC921
Q620 2SA1175 AMP
IC003 CX10023 PAL JOG
IC002 BA7007 SECAM
Q020,019 2SA1175 SW
Q021 2SC2785 SW
Q022 2SC2785 SW
IC001 BA634 FLIP FLOP
IC004 CX894
Q023 2SC2785 EQ
Q024 2SA1175 EQ
D013 ISS133
IC005 CX20061
Q102 DTA144ES SW
Q101 DTC144ES SW
Q100 DTC144WS SW
Q010 2SD773 REG
Q011 2SA1175 SW
Q067 2SC2785 SW
Q015 2SC2785 SW
Q068,016 2SC2785 SW
Q617 2SA1150 REG
D006 MC921
D005 ISS133
Q030 2SC2785 SW
Q031 DTC124ES SW
D014 ISS133
Q103 2SC2785 AMP
D023 ISS133
IC009(1/2) CX20043 Y I CHIP
D015 ISS133
Q035 2SC403SP SW
D016 MC931
Q036 2SC403SP DARK CLIP
Q037 2SA844 WHITE CLIP
Q038 2SA844 AMP
Q039 2SC403SP THERMAL COMP
D017-020 ISS133
Q040 2SC403SP AMP
Q041 2SA844 BUFF
Q042-044 2SC403SP AMP
Q045 2SA844 BUFF
IC009(1/2) CX20043 Y I CHIP
Q401 2SC2785
Q056 2SC403SP BUFF
Q055,054 2SA844 EQ
Q053 2SA844 AMP
Q075 DTC144WS SW
D022,021 ISS133
D030,031 ISS133
IC011 CX20061 SW
D027 MC921
D029 RD10E-B1
PS001 ICP-N20
IC401 CX866A Y COMB/DOC
Q052 2SC403SP AMP
Q051 2SA844 AMP
Q050 2SC403SP THERMAL COMP
Q049,048 2SC403SP AMP
Q047 2SC403SP BUFF
Q604 DTC124ES SW
Q063 2SC2785 SW
Q060 2SA1175 AMP
Q064 2SC2785 SW
Q062 2SA1175 AMP
Q061 2SC2785 SW
Q065 2SC2785 SW
Q069 2SA1175 AMP
D036 ISS133
IC012 CX7926 TSG
AUDIO IN
AUDIO OUT
CN007 (WHT)
AUDIO OUT (X)
AUDIO OUT (G)
AUDIO IN (G)
AUDIO IN (X)
TO TA-22 BOARD CN301
CN005 (WHT)
RF AUDIO OUT
GND
MC OUT
GND
RF VIDEO OUT
TO RFU CN002
CN008 (WHT)
4.43MHz REF OUT
GND
DOC PAUSE
CTL IN
COMP SYNC OUT
RF SWP IN
MC IN
TO SS-34 BOARD CN309
CN003 (WHT)
SWD 9V
GND
SWD 12V
TO PS-46 BOARD CN106
CN004 (YEL)
REC P
PB+AUDIO DUB
DOC PULSE
V. MUTE
A* HEAD
VBP
TO SS-34 BOARD CN306
CN006 (BLK)
TU VIDEO (MX)
TU VIDEO IN (G)
TU SEL IN
COMP SYNC OUT
GND
TO TA-22 BOARD CN002
VIDEO IN
VIDEO OUT
CTL
SECAM
9V
PB 9V
6.5V
ACK
HD
BF
SECAM
C OUT
4.43MHz REF
COMP SYNC
PG
PG
Y/C
MC
no mark : PAL REC mode
( ) : PAL PB mode
〈 〉 : SECAM REC mode
[ ] : SECAM PB mode
Marked * is not able to measure the voltage of it's position

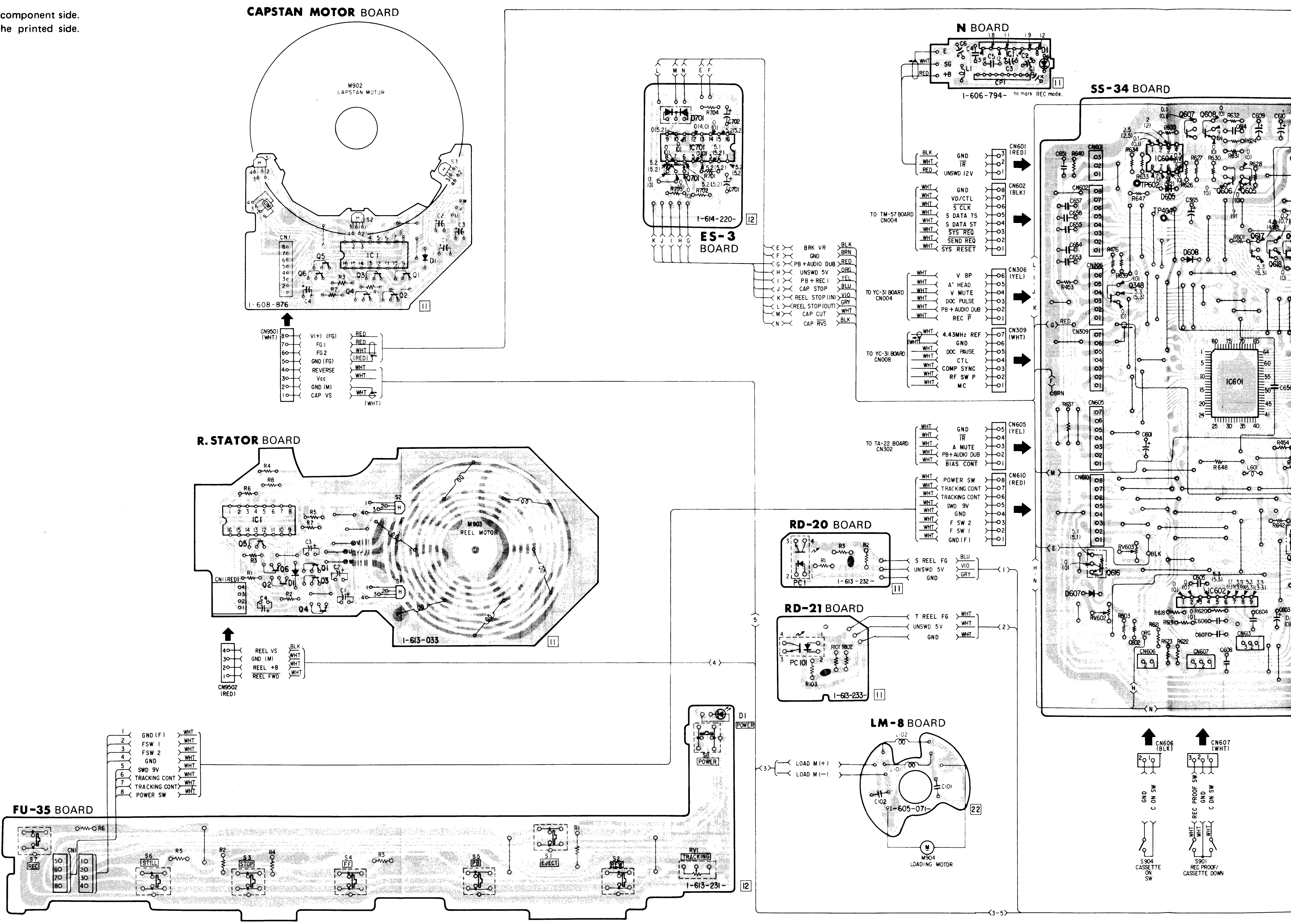
4-3. SS-34 (SYSTEM CONTROL, SERVO), RD-20 (ROTATION DETECTOR), RD-21 (ROTATION DETECTOR), LM-8 (LOADING MOTOR), FU-35 (FUNCTION, TRACKING CONTROL), N (INFRARED AMP), CAPSTAN MOTOR (CAPSTAN MOTOR), R. STAT

– Ref. No. SS-34, ES-3, RD-20, RD-21 BOARD : 4000 series, LM-8 BOARD : 9000 series, FU-35 BOARD : 8000 series, CAPSTAN MOTOR BOARD : 8200 series, R, STATOR BOARD : 8100 series –

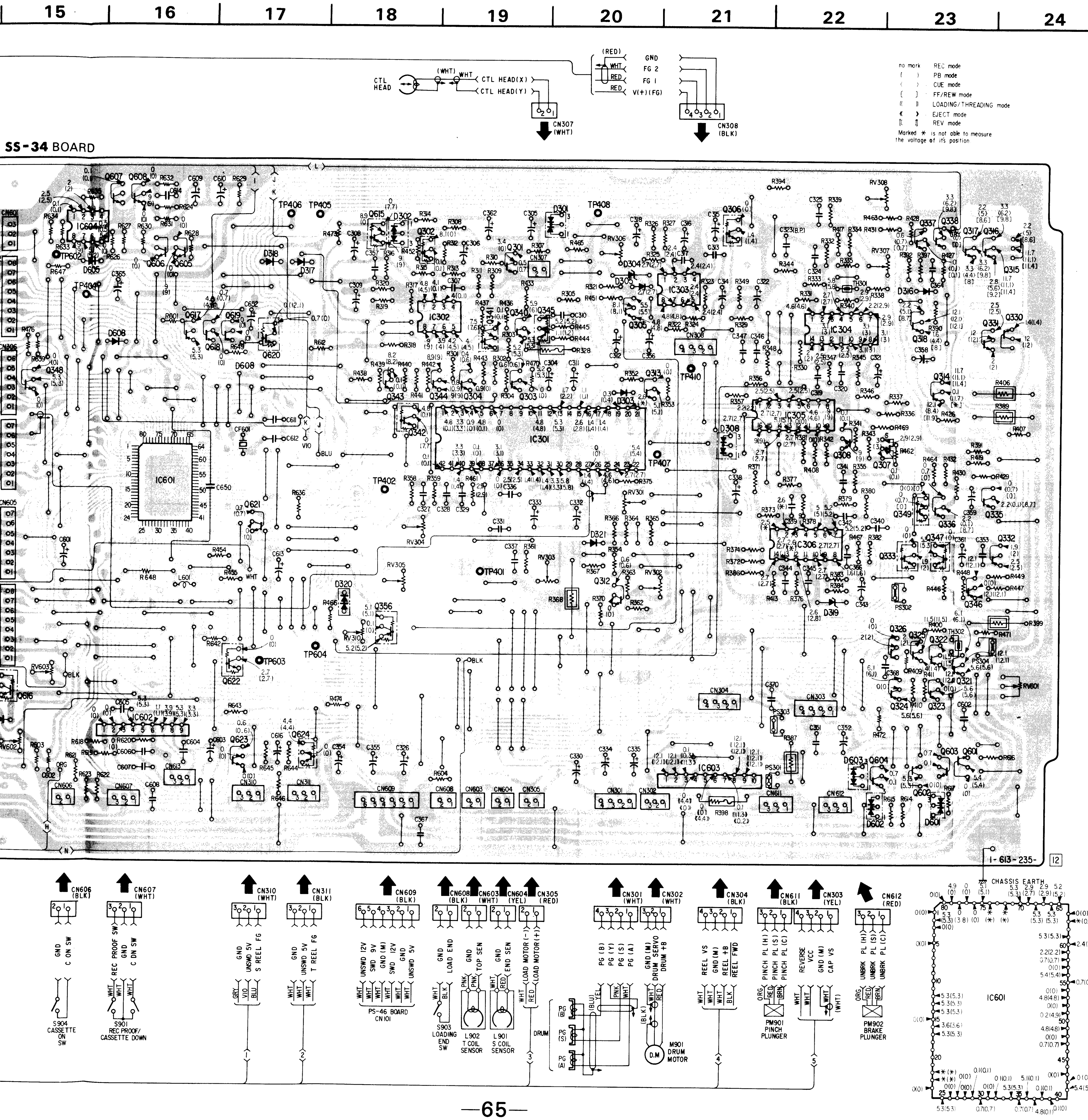
Note:

- ○— : indicates a lead wire mounted on the component side.
- ●— : indicates a lead wire mounted on the printed side.
- ▨ : soldering side
- ▨ : B+ pattern
- : component side

When indicating parts by reference number, please include the board name.


CAPSTAN MOTOR BOARD
M902
CAPSTAN MOTOR
IC1
Q1
Q2
Q3
Q4
Q5
Q6
D1
CN1
1-608-876
11
CN9501 (WHT)
V(+) (FG)
FG1
FG2
GND (FG)
REVERSE
Vcc
GND (M)
CAP VS
RED
RED
WHT
(RED)
WHT
WHT
WHT
(WHT)
R. STATOR BOARD
IC1
M903
REEL MOTOR
S1
S2
CN1 (RED)
1-613-033
11
CN9502 (RED)
REEL VS
GND (M)
REEL +B
REEL FWD
BLK
WHT
WHT
WHT
ES-3 BOARD
D701
IC701
Q701
R701
R702
R704
C701
C702
1-614-220-
12
E
F
G
H
I
J
K
L
M
N
BRK VR
GND
PB + AUDIO DUB
UNSWD 5V
PB + REC I
CAP STOP
REEL STOP (IN)
REEL STOP (OUT)
CAP CUT
CAP RVS
BLK
BRN
RED
ORG
YEL
BLU
VIO
GRY
WHT
BLK
N BOARD
CP1
1-606-794-
no mark REC mode.
11
WHT
SG
RED
+B
SS-34 BOARD
CN601 (RED)
GND
IR
UNSWD 12V
BLK
WHT
RED
TO TM-57 BOARD CN004
CN602 (BLK)
GND
VD/CTL
S CLK
S DATA TS
S DATA ST
SYS REQ
SEND REQ
SYS RESET
TO YC-31 BOARD CN004
CN306 (YEL)
V BP
A' HEAD
V MUTE
DOC PULSE
PB + AUDIO DUB
REC P
TO YC-31 BOARD CN008
CN309 (WHT)
4.43MHz REF
GND
DOC PAUSE
CTL
COMP SYNC
RF SW P
MC
TO TA-22 BOARD CN302
CN605 (YEL)
GND
IR
A MUTE
PB+AUDIO DUB
BIAS CONT
CN610 (RED)
POWER SW
TRACKING CONT
TRACKING CONT
SWD 9V
GND
F SW 2
F SW 1
GND (F)
IC601
IC602
IC604
TP404
TP602
RD-20 BOARD
PC1
1-613-232-
11
S REEL FG
UNSWD 5V
GND
BLU
VIO
GRY
RD-21 BOARD
PC101
1-613-233-
11
T REEL FG
UNSWD 5V
GND
LM-8 BOARD
LOAD M (+)
LOAD M (−)
1-605-071-
22
M904
LOADING MOTOR
CN606 (BLK)
CN607 (WHT)
GND
C ON SW
REC PROOF SW
S904
CASSETTE ON SW
S901
REC PROOF/CASSETTE DOWN
FU-35 BOARD
GND (F)
FSW 1
FSW 2
GND
SWD 9V
TRACKING CONT
TRACKING CONT
POWER SW
S1 EJECT
S2 REW
S3 STOP
S4 FF
S5 PB
S6 STILL
S7 REC
S8 POWER
D1 POWER
RV1 TRACKING
CN1
1-613-231-
12

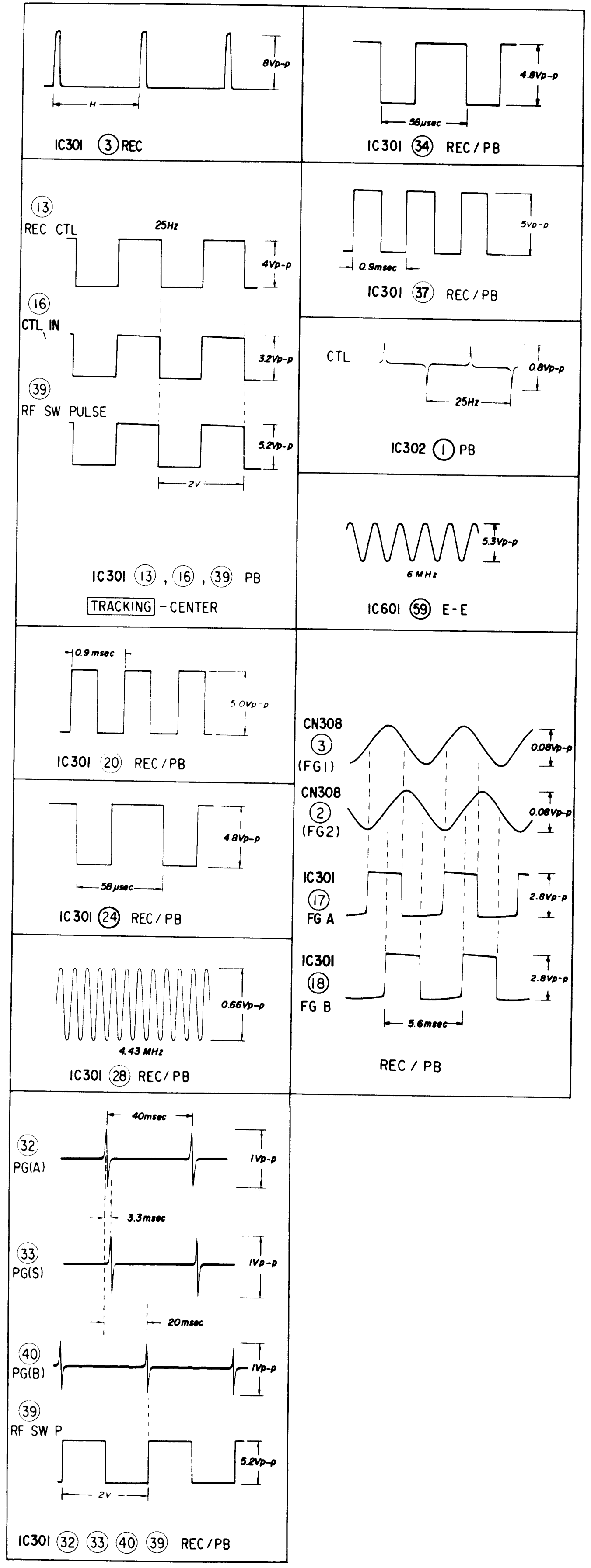
OR (CAPSTAN MOTOR), R. STATOR (REEL MOTOR), ES-3 (BRAKE CONTROL) PRINTED WIRING BOARDS


15
16
17
18
19
20
21
22
23
24
25
26
27
SS-34 BOARD
CTL HEAD
(WHT)
WHT
CTL HEAD(X)
CTL HEAD(Y)
CN307 (WHT)
(RED)
WHT
RED
RED
GND
FG 2
FG 1
V(+)(FG)
CN308 (BLK)
IC601
IC301
IC302
IC303
IC304
IC305
IC306
IC602
IC603
IC604
TP401
TP402
TP404
TP405
TP406
TP407
TP408
TP410
TP602
TP603
TP604
1-613-235-
12
CN606 (BLK)
GND
C ON SW
S904 CASSETTE ON SW
CN607 (WHT)
REC PROOF SW
GND
C DN SW
S901 REC PROOF/ CASSETTE DOWN
CN310 (WHT)
GND
UNSWD 5V
S REEL FG
GRY
VIO
BLU
CN311 (BLK)
GND
UNSWD 5V
T REEL FG
CN609 (BLK)
UNSWD 12V
SWD 9V
GND (M)
SWD 12V
GND
UNSWD 5V
PS-46 BOARD CN101
CN608 (BLK)
GND
LOAD END
S903 LOADING END SW
CN603 (WHT)
GND
TOP SEN
L902 T COIL SENSOR
CN604 (YEL)
GND
END SEN
L901 S COIL SENSOR
CN305 (RED)
LOAD MOTOR (−)
LOAD MOTOR (+)
DRUM
PG (B)
PG (S)
PG (A)
CN301 (WHT)
PG (B)
PG (Y)
PG (S)
PG (A)
CN302 (WHT)
GND (M)
DRUM SERVO
DRUM +B
M901 DRUM MOTOR
D.M
CN304 (BLK)
REEL VS
GND (M)
REEL +B
REEL FWD
CN611 (BLK)
PINCH PL (H)
PINCH PL (S)
PINCH PL (C)
PM901 PINCH PLUNGER
CN303 (YEL)
REVERSE
VCC
GND (M)
CAP VS
CN612 (RED)
UNBRK PL (H)
UNBRK PL (S)
UNBRK PL (C)
PM902 BRAKE PLUNGER
CHASSIS EARTH
1
2
3
4
5

no mark REC mode
( ) PB mode
〈 〉 CUE mode
[ ] FF/REW mode
(( )) LOADING/THREADING mode
《 》 EJECT mode
[[ ]] REV mode
Marked ＊ is not able to measure the voltage of it's position

Q, IC	D	ADJ, TP
607,608		
IC604 606,605		RV308 TP408 TP406,TP405
306 615 337,338 317,316 302,301,315	301 302 605 318,317	RV306 RV307
IC303	304,316 305	TP602 TP404
305 IC302,340,345 619,620,IC304 617,618,318,330 341,331	608	
313 304,303 343,344,314 342	303	TP410
348 IC305		
308,307 IC301	308	TP407
IC601 335 349,336		TP402 RV301
621		RV304
IC306 333,332 347	321	TP401
346 312	320 319	RV303 RV305 RV302
356 326,322 325 622 321 323 324		RV310 TP604 TP603 RV601
616		
IC602	607	
623,624 603,601 604,602 IC603	603 601 602	RV603 RV602
Q, IC	D	ADJ, TP

SS-34 BOARD (SERVO/SYSTEM CONTROL)


28
29
30
8Vp-p
H
IC301 ③ REC
4.8Vp-p
58μsec
IC301 ㉞ REC/PB
⑬ REC CTL
25Hz
4Vp-p
⑯ CTL IN
3.2Vp-p
㊴ RF SW PULSE
5.2Vp-p
2V
IC301 ⑬, ⑯, ㊴ PB
TRACKING - CENTER
5Vp-p
0.9msec
IC301 ㊲ REC/PB
CTL
0.8Vp-p
25Hz
IC302 ① PB
5.3Vp-p
6MHz
IC601 (59) E-E
0.9msec
5.0Vp-p
IC301 ⑳ REC/PB
CN308 ③ (FG1)
0.08Vp-p
CN308 ② (FG2)
0.08Vp-p
IC301 ⑰ FG A
2.8Vp-p
IC301 ⑱ FG B
2.8Vp-p
5.6msec
REC/PB
4.8Vp-p
58μsec
IC301 ㉔ REC/PB
0.66Vp-p
4.43MHz
IC301 ㉘ REC/PB
40msec
㉜ PG(A)
1Vp-p
3.3msec
㉝ PG(S)
1Vp-p
20msec
㊵ PG(B)
1Vp-p
㊴ RF SW P
5.2Vp-p
2V
IC301 ㉜ ㉝ ㊵ ㊴ REC/PB

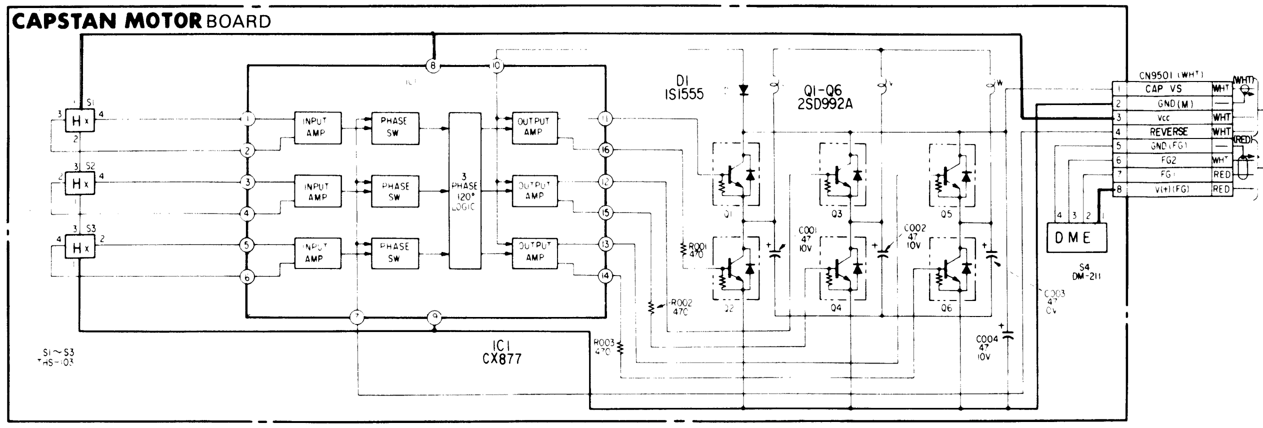
A
B
C
D
E
F
G
H
I
J

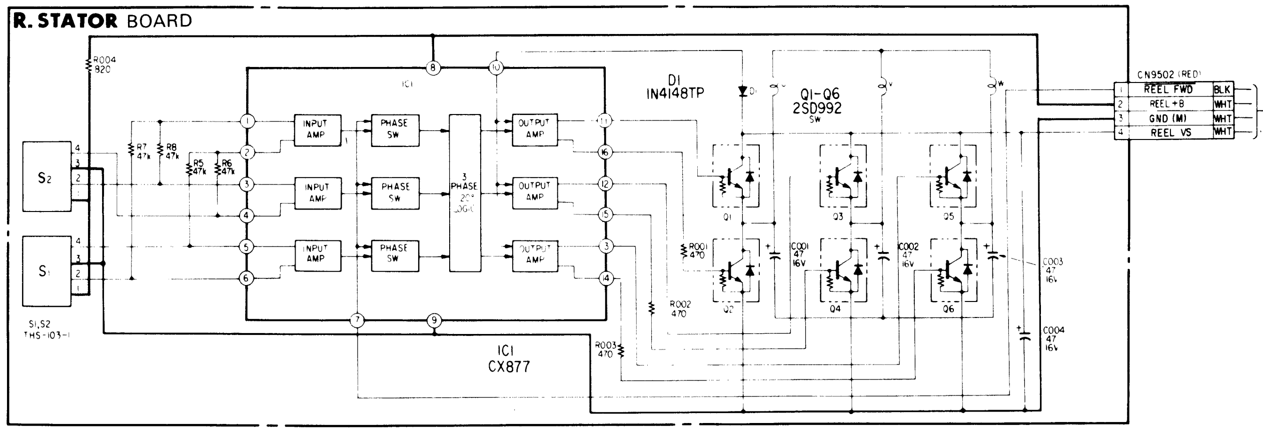
SERVO/SYSTEM CONTROL

SERVO/SYSTEM CONTROL

SS-34 (SYSTEM CONTROL, SERVO), RD-20 (ROTATION DETECTOR), RD-21 (ROTATION DETECTOR), LM-8 (LOADING MOTOR), FU-35 (FUNCTION, TRACKING CONTROL), N (INFRARED AMP), CAPSTAN MOTOR (CAPSTAN MOTOR), R. STATOR (

– Ref. No. SS-34, ES-3, RD-20, RD-21 BOARD : 4000 series, LM-8 BOARD : 9000 series, FU-35 BOARD : 8000 series, CAPSTAN MOTOR BOARD : 8200 series, R. STATOR BOARD : 8100 series –


CAPSTAN MOTOR BOARD
INPUT AMP
PHASE SW
3 PHASE 120° LOGIC
OUTPUT AMP
D1 1S1555
Q1–Q6 2SD992A
IC1 CX877
S1~S3 *HS-03
DME
S4 DM-211
CN9501
CAP VS
GND(M)
VCC
REVERSE
GND(FG)
FG2
FG
V(+)(FG)

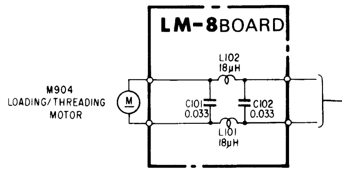

R. STATOR BOARD
INPUT AMP
PHASE SW
3 PHASE 120° LOGIC
OUTPUT AMP
D1 1N4148TP
Q1–Q6 2SD992
IC1 CX877
S1, S2 *HS-03
CN9502
REEL FWD
REEL +B
GND (M)
REEL VS

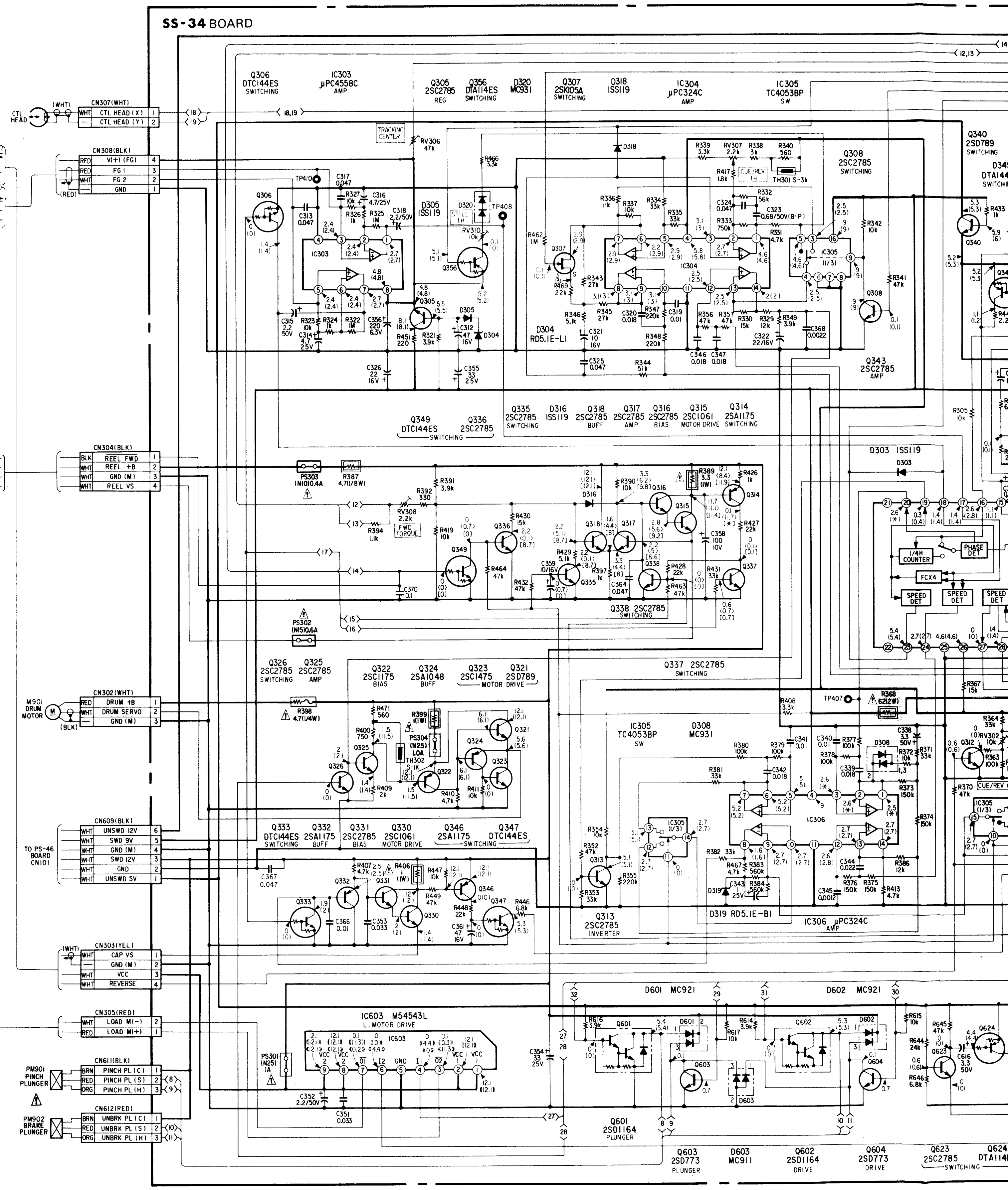
Note:

- All resistors are in ohms, 1/6W unless otherwise noted.
- All capacitors are in μF (p:pF) unless otherwise noted. 50V or less are not indicated except for electrolytic capacitors.
- All variable and semi fixed resistors have characteristic curve B, unless otherwise noted.
- ▭ : Nonflammable resistor
- ▭ : Fusible resistor
- ——— : B+ bus.
- The voltage value is reference value between the grounding when the color bar signal is received from a color bar generator.
- The voltage value is measured using a digital tester (10MΩ).

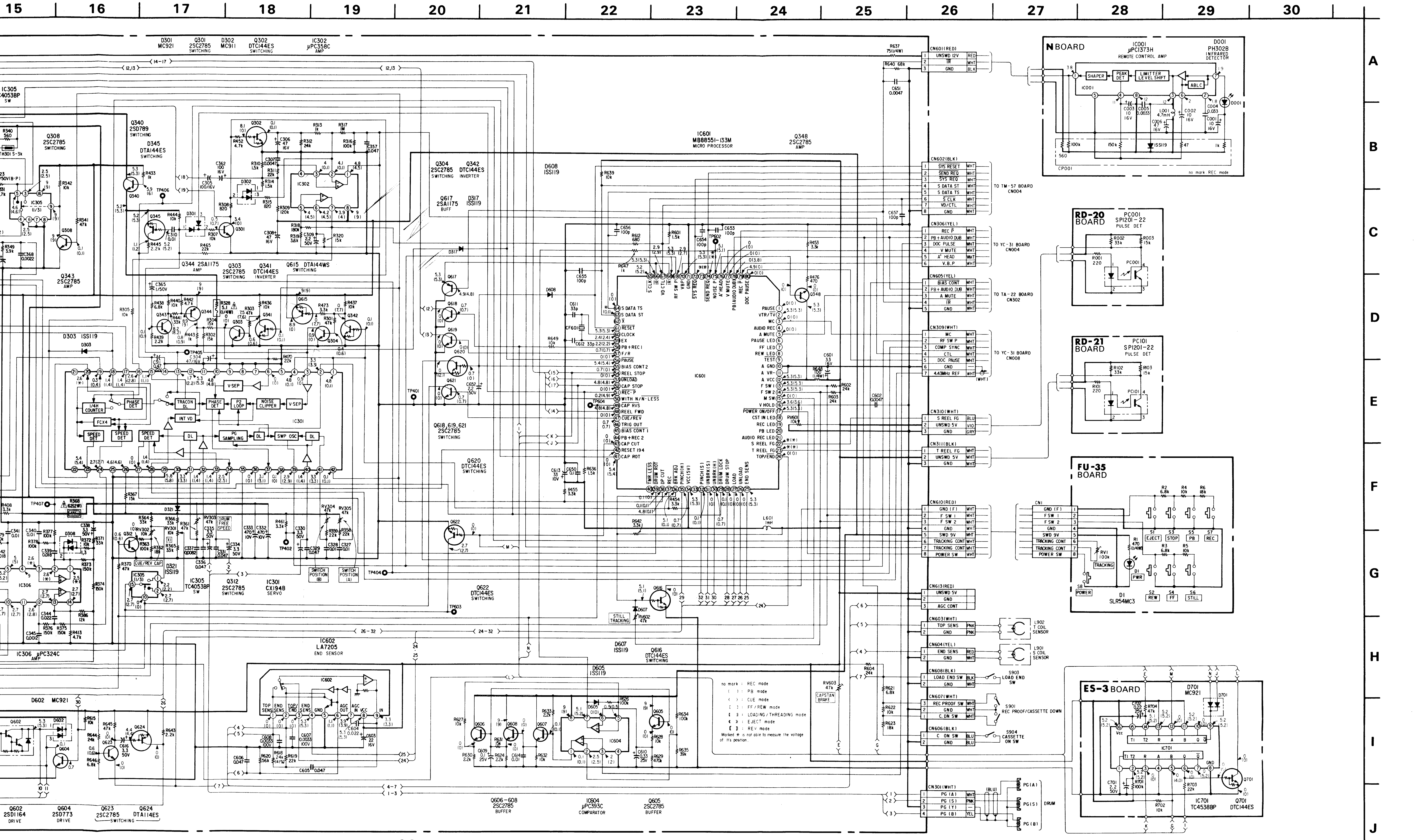
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.


LM-8 BOARD
M904 LOADING/THREADING MOTOR
L102 18μH
L101 18μH
C101 0.033
C102 0.033


SS-34 BOARD
CTL HEAD
CN307
CN308
CN3041
CN302
CN609
CN303
CN305
CN611
CN612
M901 DRUM MOTOR
TO PS-46 BOARD CN101
PM901 PINCH PLUNGER
PM902 BRAKE PLUNGER
Q306 DTC144ES SWITCHING
IC303 μPC4558C AMP
Q305 2SC2785 REG
Q356 DTA114ES SWITCHING
D320 MC931
Q307 2SK105A SWITCHING
D318 1SS119
IC304 μPC324C AMP
IC305 TC4053BP SW
Q308 2SC2785 SWITCHING
Q340 2SD789 SWITCHING
Q343 2SC2785 AMP
Q349 DTC144ES
Q336 2SC2785
Q335 2SC2785 SWITCHING
D316 1SS119
Q318 2SC2785 BUFF
Q317 2SC2785 AMP
Q316 2SC2785 BIAS
Q315 2SC1061 MOTOR DRIVE
Q314 2SA1175 SWITCHING
Q338 2SC2785 SWITCHING
Q337 2SC2785 SWITCHING
D303 1SS119
1/4H COUNTER
PHASE DET
FCX4
SPEED DET
Q326 2SC2785 SWITCHING
Q325 2SC2785 AMP
Q322 2SC1175 BIAS
Q324 2SA1048 BUFF
Q323 2SC1475 MOTOR DRIVE
Q321 2SD789 MOTOR DRIVE
IC305 TC4053BP SW
D308 MC931
IC306 μPC324C AMP
Q313 2SC2785 INVERTER
D319 RD5.1E-B1
D304 RD5.1E-L1
Q333 DTC144ES SWITCHING
Q332 2SA1175 BUFF
Q331 2SC2785 BIAS
Q330 2SC1061 MOTOR DRIVE
Q346 2SA1175 SWITCHING
Q347 DTC144ES SWITCHING
IC603 M54543L L. MOTOR DRIVE
D601 MC921
D602 MC921
Q601 2SD1164 PLUNGER
Q603 2SD773 PLUNGER
D603 MC911
Q602 2SD1164 DRIVE
Q604 2SD773 DRIVE
Q623 2SC2785 SWITCHING
Q624 DTA114

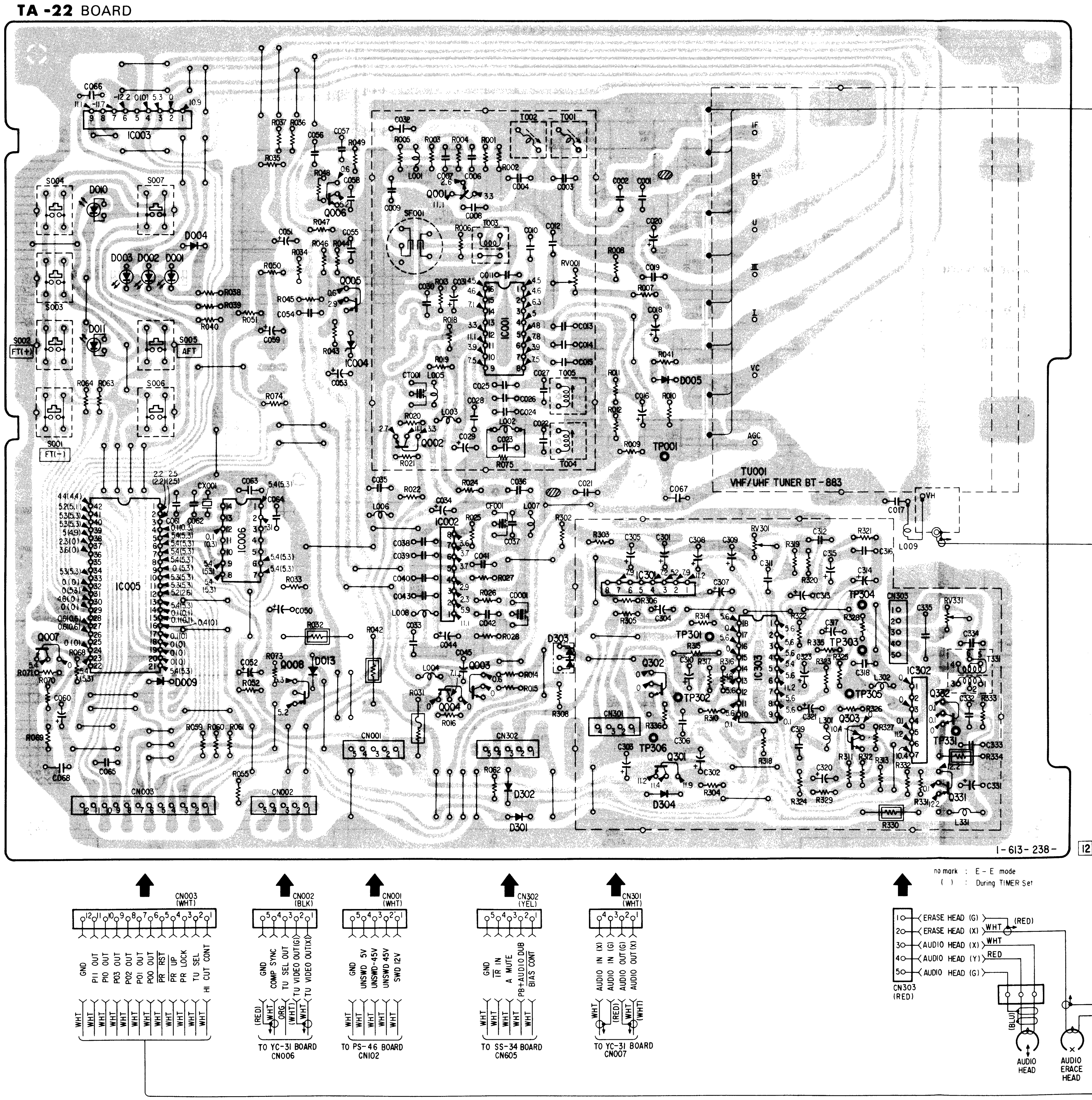
STAN MOTOR), R. STATOR (REEL MOTOR), ES-3 (BRAKE CONTROL) SCHEMATIC DIAGRAM


15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
A
B
C
D
E
F
G
H
I
J
D301 MC921
Q301 2SC2785 SWITCHING
D302 MC911
Q302 DTC144ES SWITCHING
IC302 μPC358C AMP
IC305 TC4053BP SW
Q308 2SC2785 SWITCHING
Q340 2SD789 SWITCHING
D345 DTA144ES SWITCHING
Q343 2SC2785 AMP
Q344 2SA1175 AMP
Q303 2SC2785 SWITCHING
Q341 DTC144ES INVERTER
Q615 DTA144WS SWITCHING
D303 1SS119
IC301 CX194B SERVO
Q312 2SC2785 SWITCHING
D321 1SS119
IC306 μPC324C AMP
IC601 MB88551-133M MICRO PROCESSOR
Q348 2SC2785 AMP
Q304 2SC2785 SWITCHING
Q342 DTC144ES INVERTER
Q617 2SA1175 BUFF
D317 1SS119
D608 1SS119
Q618, 619, 621 2SC2785 SWITCHING
Q620 DTC144ES SWITCHING
Q622 DTC144ES SWITCHING
D607 1SS119
Q616 DTC144ES SWITCHING
D605 1SS119
IC602 LA7205 END SENSOR
IC604 μPC393C COMPARATOR
Q606-608 2SC2785 BUFFER
Q605 2SC2785 BUFFER
D602 MC921
Q602 2SD1164 DRIVE
Q604 2SD773 DRIVE
Q623 2SC2785 SWITCHING
Q624 DTA114ES SWITCHING
CN601 (RED)
CN602 (BLK)
CN306 (YEL)
CN605 (YEL)
CN309 (WHT)
CN310 (WHT)
CN311 (BLK)
CN610 (RED)
CN613 (RED)
CN603 (WHT)
CN604 (YEL)
CN608 (BLK)
CN607 (WHT)
CN606 (BLK)
CN301 (WHT)
TO TM-57 BOARD CN004
TO YC-31 BOARD CN004
TO TA-22 BOARD CN302
TO YC-31 BOARD CN008
N BOARD
IC001 μPC1373H REMOTE CONTROL AMP
D001 PH302B INFRARED DETECTOR
SHAPER
PEAK DET
LIMITTER LEVEL SHIFT
ABLC
RD-20 BOARD
PC001 SPI201-22 PULSE DET
RD-21 BOARD
PC101 SPI201-22 PULSE DET
FU-35 BOARD
EJECT
STOP
PB
REC
POWER
REW
FF
STILL
TRACKING
PWR
D1 SLR54MC3
L902 T COIL SENSOR
L901 S COIL SENSOR
S903 LOAD END SW
S901 REC PROOF/CASSETTE DOWN
S904 CASSETTE ON SW
PG (A)
PG (S)
PG (B)
DRUM
ES-3 BOARD
D701 MC921
IC701 TC4538BP
Q701 DTC144ES
CAPSTAN BRAKE
STILL TRACKING
CUE/REV CAP
DRUM FREE SPEED
SWITCH POSITION (B)
SWITCH POSITION (A)
no mark : REC mode
( ) : PB mode
〈 〉 : CUE mode
{ } : FF/REW mode
【 】 : LOADING/THREADING mode
『 』 : EJECT mode
〔 〕 : REV mode
Marked ✱ is not able to measure the voltage of its position.

4-4. TA-22 (VIF, AFT, SIF, AUTO PROGRAM AUDIO), MT-10 (TUNER), TM-57 (TIMER INDICATOR), TM-70 (SWITCH) PRINTED WIRING BOARDS

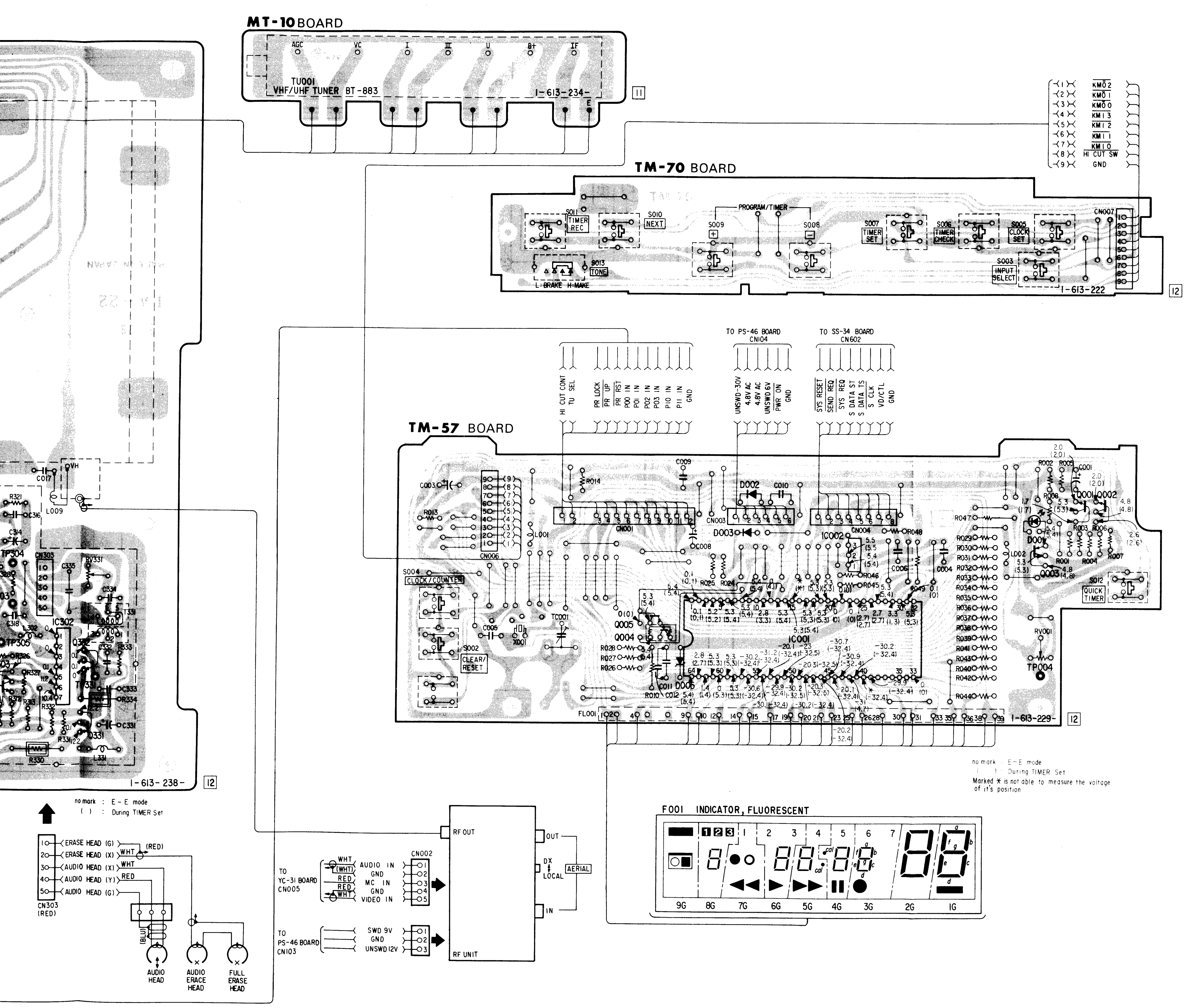
– Ref. No. TA-22, MT-20 BOARD : 5000 series, TM-57, TM-70 BOARD : 6000 series –

Q, IC	D	ADJ, TP
IC003		
001		
006	010	
	004	
	003,002,001	RV001
005		
IC001		
IC004		
	011	
	005	
002		
		TP001
		RV301
IC006		
IC002		
IC005		
IC301		TP304
		RV331
007		TP301
		TP303
	303	
IC303		
332		
003, 302	009	TP305
008,004,IC302		TP302
303	013	
		TP331
		TP306
301, 331	302	
	304	
	301	
Q, IC	D	ADJ, TP


TA-22 BOARD
IC003
IC001
IC002
IC004
IC005
IC006
IC301
IC302
IC303
TU001
VHF/UHF TUNER BT-883
S001 FT(−)
S002 FT(+)
S005 AFT
TP001
TP301
TP302
TP303
TP304
TP305
TP306
TP331
RV001
RV301
RV331
1-613-238-
12
CN003 (WHT)
GND
P11 OUT
P10 OUT
P03 OUT
P02 OUT
P01 OUT
P00 OUT
PR RST
PR UP
PR LOCK
TU SEL
HI CUT CONT
WHT
CN002 (BLK)
GND
COMP SYNC
TU SEL OUT
TU VIDEO OUT(G)
TU VIDEO OUT(X)
(RED)
WHT
ORG
(WHT)
TO YC-31 BOARD CN006
CN001 (WHT)
GND
UNSWD 5V
UNSWD-45V
UNSWD 45V
SWD 12V
TO PS-46 BOARD CN102
CN302 (YEL)
GND
IR IN
A MUTE
PB+AUDIO DUB
BIAS CONT
TO SS-34 BOARD CN605
CN301 (WHT)
AUDIO IN (X)
AUDIO IN (G)
AUDIO OUT (G)
AUDIO OUT (X)
TO YC-31 BOARD CN007
CN303 (RED)
ERASE HEAD (G)
ERASE HEAD (X)
AUDIO HEAD (X)
AUDIO HEAD (Y)
AUDIO HEAD (G)
(RED)
WHT
RED
(BLU)
AUDIO HEAD
AUDIO ERACE HEAD

no mark : E – E mode
( ) : During TIMER Set

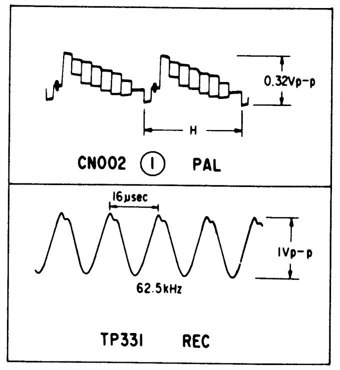
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28


MT-10 BOARD
TU001
VHF/UHF TUNER BT-883
1-613-234-
AGC
VC
I
III
U
B+
IF
E
TM-70 BOARD
PROGRAM/TIMER
S011 TIMER REC
S010 NEXT
S009 +
S008 −
S007 TIMER SET
S006 TIMER CHECK
S005 CLOCK SET
S003 INPUT SELECT
S013 TONE
L:BRAKE H:MAKE
CN007
1-613-222
KM02
KM01
KM00
KM13
KM12
KM11
KM10
HI CUT SW
GND
TO PS-46 BOARD CN104
TO SS-34 BOARD CN602
HI CUT CONT
TU SEL
PR LOCK
PR UP
PR RST
P00 IN
P01 IN
P02 IN
P03 IN
P10 IN
P11 IN
GND
UNSWD-30V
4.8V AC
4.8V AC
UNSWD 6V
PWR ON
GND
SYS RESET
SEND REQ
SYS REQ
S DATA ST
S DATA TS
S CLK
VD/CTL
GND
TM-57 BOARD
CN001
CN003
CN004
CN006
IC001
IC002
D001
D002
D003
D005
Q001
Q002
Q003
Q004
Q005
S002 CLEAR/RESET
S004 CLOCK/COUNTER
S012 QUICK TIMER
RV001
TP004
FL001
1-613-229-
1-613-238-
IC302
TP304
TP305
CN303
R330
L331
Q331
ERASE HEAD (G)
ERASE HEAD (X)
AUDIO HEAD (X)
AUDIO HEAD (Y)
AUDIO HEAD (G)
CN303 (RED)
(RED)
WHT
RED
(BLU)
AUDIO HEAD
AUDIO ERACE HEAD
FULL ERASE HEAD
TO YC-31 BOARD CN005
AUDIO IN
GND
MC IN
GND
VIDEO IN
CN002
TO PS-46 BOARD CN103
SWD 9V
GND
UNSWD 12V
RF OUT
OUT
DX
LOCAL
AERIAL
IN
RF UNIT
F001 INDICATOR, FLUORESCENT
9G
8G
7G
6G
5G
4G
3G
2G
1G

no mark : E-E mode
( ) : During TIMER Set

no mark : E-E mode
( ) : During TIMER Set
Marked * is not able to measure the voltage of it's position

TA-22 BOARD


0.32Vp-p
H
CN002 ① PAL
16μsec
1Vp-p
62.5kHz
TP331 REC

A
B
C
D
E
F
G
H
I
J

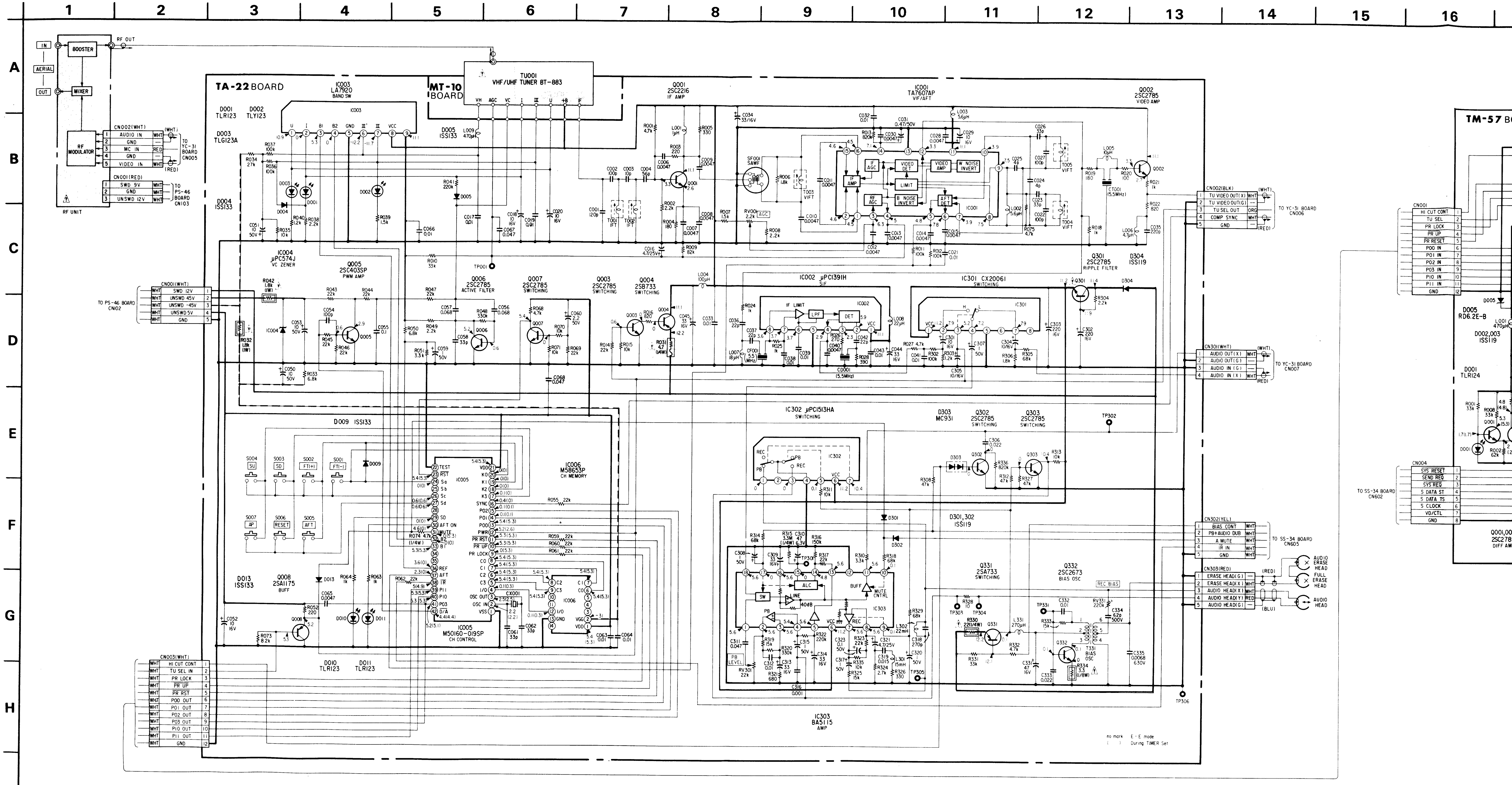
Note:

- ○— : indicates a lead wire mounted on the component side.
- ●— : indicates a lead wire mounted on the printed side.
- ▨ : soldering side
- ▨ : B+ pattern

When indicating parts by reference number, please include the board name.

TA-22 (VIF, AFT, SIF, AUTO PROGRAM AUDIO), MT-10 (TUNER), TM-57 (TIMER INDICATOR), TM-70 (SWITCH) SCHEMATIC DIAGRAM

– Ref. No. TA-22, MT-20 BOARD : 5000 series, TM-57, TM-70 BOARD : 6000 series –


1
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13
14
15
16
A
B
C
D
E
F
G
H
I
J
RF UNIT
BOOSTER
MIXER
RF MODULATOR
RF OUT
IN
AERIAL
OUT
CN002(WHT)
AUDIO IN
GND
MC IN
VIDEO IN
TO YC-31 BOARD CN005
CN001(RED)
SWD 9V
UNSWD 12V
TO PS-46 BOARD CN103
TA-22 BOARD
MT-10 BOARD
TU001 VHF/UHF TUNER BT-883
IC003 LA7920 BAND SW
IC004 μPC574J VC ZENER
Q005 2SC403SP PWM AMP
Q006 2SC2785 ACTIVE FILTER
Q007 2SC2785 SWITCHING
Q003 2SC2785 SWITCHING
Q004 2SB733 SWITCHING
Q001 2SC2216 IF AMP
IC001 TA7607AP VIF/AFT
Q002 2SC2785 VIDEO AMP
SF001 SAWF
IF AGC
IF AMP
RF AGC
VIDEO DET
LIMIT
B NOISE INVERT
AFT DET
VIDEO AMP
W NOISE INVERT
T001 IFT
T002 IFT
T003 VIFT
T004 VIFT
T005 VIFT
CT001 (5.5MHz)
CN002(BLK)
TU VIDEO OUT(X)
TU VIDEO OUT(G)
TU SEL OUT
COMP SYNC
GND
TO YC-31 BOARD CN006
IC002 μPC1391H SIF
IF LIMIT
LPF
DET
CD001 (5.5MHz)
IC301 CX20061 SWITCHING
Q301 2SC2785 RIPPLE FILTER
D304 1SS119
CN301(WHT)
AUDIO OUT(X)
AUDIO OUT(G)
AUDIO IN (G)
AUDIO IN (X)
TO YC-31 BOARD CN007
CN001(WHT)
SWD 12V
UNSWD 45V
UNSWD -45V
UNSWD 5V
TO PS-46 BOARD CN102
D009 1SS133
S004 SU
S003 SD
S002 FT(+)
S001 FT(−)
S007 AP
S006 RESET
S005 AFT
IC005 M50160-019SP CH CONTROL
IC006 M58653P CH MEMORY
CX001
D013 1SS133
Q008 2SA1175 BUFF
D010 TLR123
D011 TLR123
CN003(WHT)
HI CUT CONT
TU SEL IN
PR LOCK
PR UP
PR RST
P00 OUT
P01 OUT
P02 OUT
P03 OUT
P10 OUT
P11 OUT
GND
IC302 μPC1513HA SWITCHING
D303 MC931
Q302 2SC2785 SWITCHING
Q303 2SC2785 SWITCHING
TP302
D301,302 1SS119
IC303 BA5115 AMP
ALC
SW
LINE
40dB
BUFF
MUTE CNTRL
PB LEVEL
Q331 2SA733 SWITCHING
Q332 2SC2673 BIAS OSC
T331 BIAS OSC
REC BIAS
CN302(YEL)
BIAS CONT
PB+AUDIO DUB
A MUTE
IR IN
TO SS-34 BOARD CN605
CN303(RED)
ERASE HEAD(G)
ERASE HEAD(X)
AUDIO HEAD(X)
AUDIO HEAD(Y)
AUDIO HEAD(G)
AUDIO ERASE HEAD
FULL ERASE HEAD
AUDIO HEAD
TP303
TP304
TP305
TP306
TP331
no mark E-E mode
( ) During TIMER Set
TM-57 BO
CN001
HI CUT CONT
TU SEL
PR LOCK
PR UP
PR RESET
P00 IN
P01 IN
P02 IN
P03 IN
P10 IN
P11 IN
GND
D005 RD6.2E-B
D002,003 1SS119
D001 TLR124
CN004
SYS RESET
SEND REQ
SYS REQ
S DATA ST
S DATA TS
S CLOCK
VD/CTL
GND
TO SS-34 BOARD CN602
Q001,00 2SC278 DIFF AM

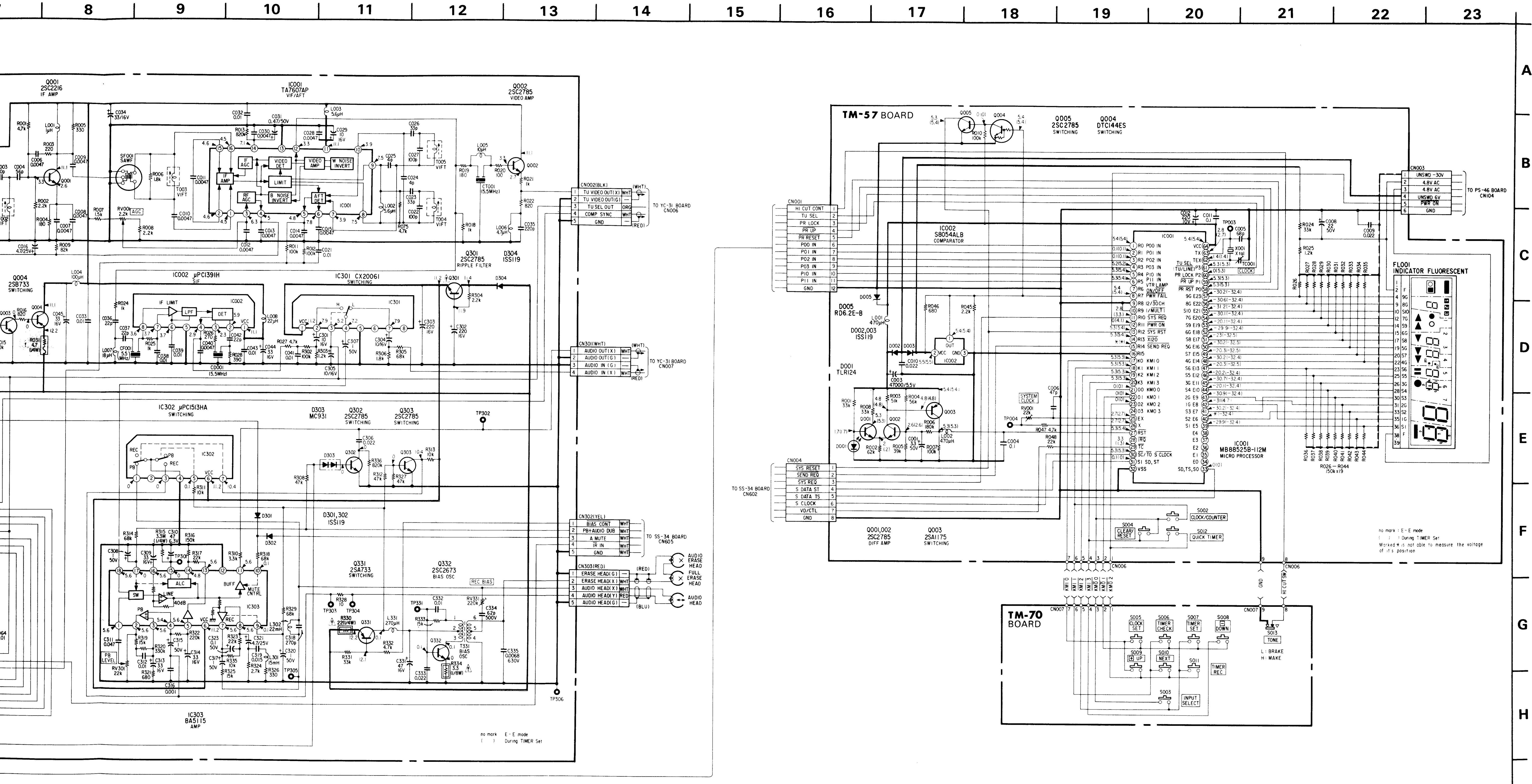
Note:

- All resistors are in ohms, 1/6W unless otherwise noted.
- All capacitors are in μF (p:pF) unless otherwise noted. 50V or less are not indicated except for electrolytic capacitors.
- All variable and semi-fixed resistors have characteristic curve B, unless otherwise noted.
- ▭ : Nonflammable resistor
- ▭ : Fusible resistor
- —— : B+ bus.
- – – – : B– bus.
- The voltage value is reference value between the grounding when the color bar signal is received from a color bar generator.
- The voltage value is measured using a digital tester (10MΩ).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

70 (SWITCH) SCHEMATIC DIAGRAM


TM-57 BOARD
TM-70 BOARD
IC001 TA7607AP VIF/AFT
IC002 μPC1391H SIF
IC301 CX20061 SWITCHING
IC302 μPC1513HA SWITCHING
IC303 BA5115 AMP
IC001 MB88525B-112M MICRO PROCESSOR
IC002 S8054ALB COMPARATOR
FL001 INDICATOR FLUORESCENT
Q001 2SC2216 IF AMP
Q002 2SC2785 VIDEO AMP
Q004 2SB733 SWITCHING
Q301 2SC2785 RIPPLE FILTER
D304 1SS119
D303 MC931
Q302 2SC2785 SWITCHING
Q303 2SC2785 SWITCHING
D301,302 1SS119
Q331 2SA733 SWITCHING
Q332 2SC2673 BIAS OSC
Q005 2SC2785 SWITCHING
Q004 DTC144ES SWITCHING
Q001,002 2SC2785 DIFF AMP
Q003 2SA1175 SWITCHING
D005 RD6.2E-B
D002,003 1SS119
D001 TLR124
CN002(BLK)
TO YC-31 BOARD CN006
CN301(WHT)
TO YC-31 BOARD CN007
CN302(YEL)
TO SS-34 BOARD CN605
CN303(RED)
AUDIO ERASE HEAD
FULL ERASE HEAD
AUDIO HEAD
CN001
CN003
TO PS-46 BOARD CN104
CN004
TO SS-34 BOARD CN602
CN006
CN007
S002 CLOCK/COUNTER
S004 CLEAR/RESET
S012 QUICK TIMER
S005 CLOCK SET
S006 TIMER CHECK
S007 TIMER SET
S008 DOWN
S009 UP
S010 NEXT
S011 TIMER REC
S003 INPUT SELECT
S013 TONE
L: BRAKE
H: MAKE
no mark : E-E mode
( ) : During TIMER Set
Marked * is not able to measure the voltage of it's position
A
B
C
D
E
F
G
H
8
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22
23

en the grounding
olor bar generator.
al tester (10MΩ).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

I

J

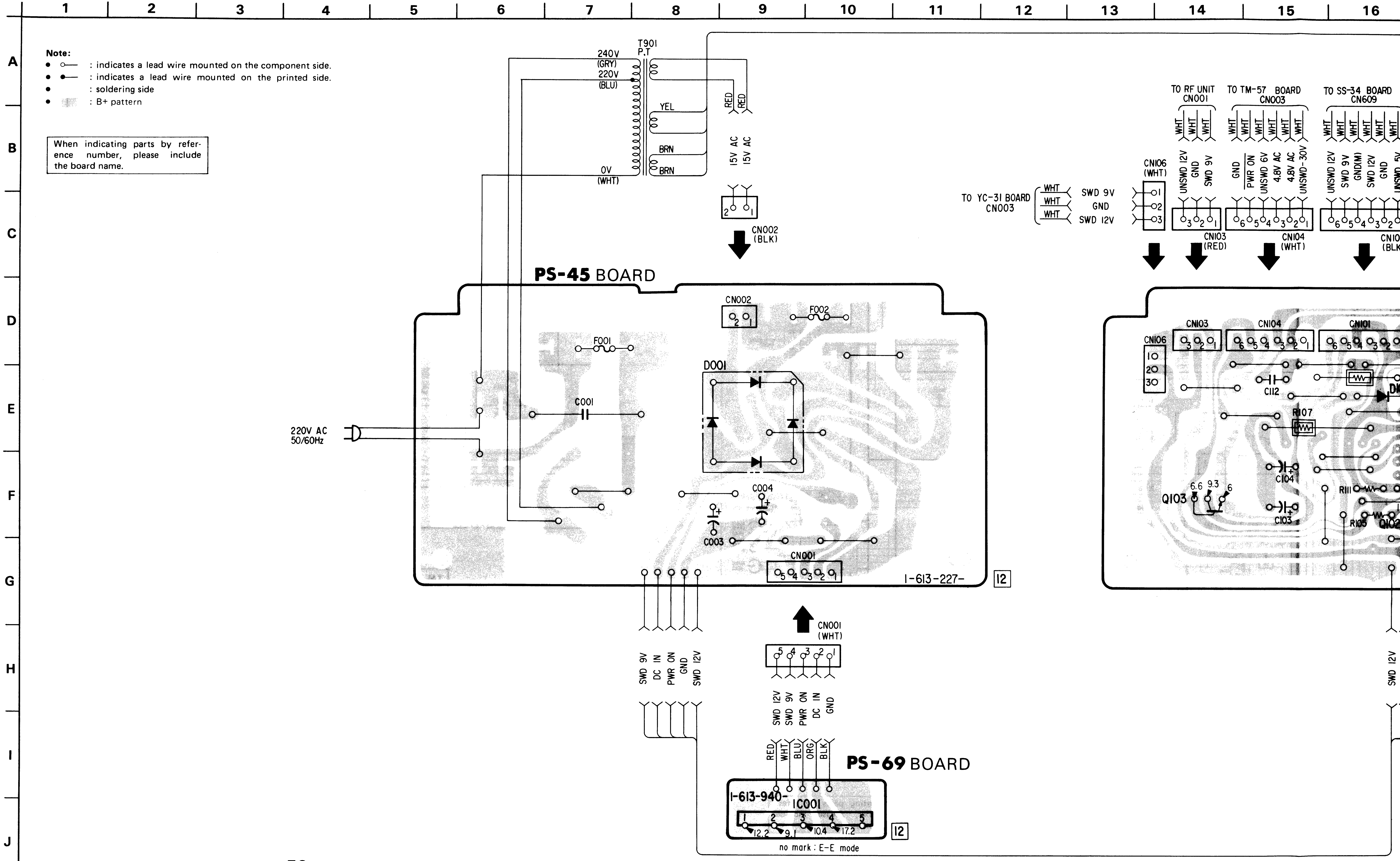
4-5. PS-45 (POWER SUPPLY), PS-46 (POWER) PS-69 PRINTED WIRING BOARDS

– Ref. No. PS-45 BOARD : 7000 series, PS-46, PS-69 BOARD : 7100 series –

Note:

- ○— : indicates a lead wire mounted on the component side.
- ●— : indicates a lead wire mounted on the printed side.
- ▨ : soldering side
- ▨ : B+ pattern

When indicating parts by reference number, please include the board name.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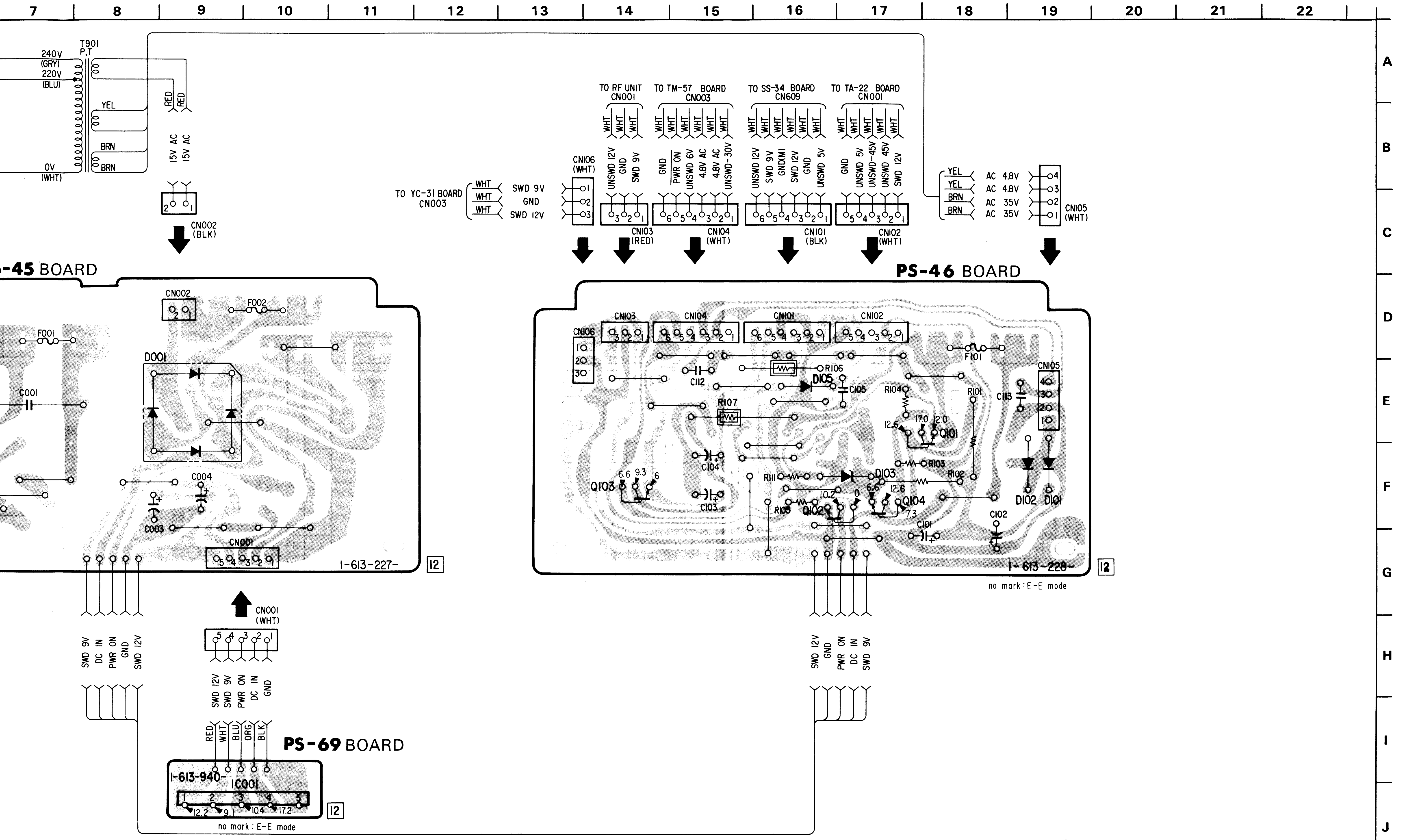
16
A
B
C
D
E
F
G
H
I
J
T901
P.T
240V
(GRY)
220V
(BLU)
0V
(WHT)
YEL
BRN
BRN
RED
RED
15V AC
15V AC
CN002
(BLK)
PS-45 BOARD
CN002
F002
F001
D001
C001
C004
C003
CN001
1-613-227-
12
220V AC
50/60Hz
SWD 9V
DC IN
PWR ON
GND
SWD 12V
CN001
(WHT)
SWD 12V
SWD 9V
PWR ON
DC IN
GND
RED
WHT
BLU
ORG
BLK
PS-69 BOARD
1-613-940-
IC001
12.2
9.1
10.4
17.2
12
no mark : E-E mode
TO YC-31 BOARD
CN003
WHT
WHT
WHT
SWD 9V
GND
SWD 12V
CN106
(WHT)
TO RF UNIT
CN001
UNSWD 12V
GND
SWD 9V
CN103
(RED)
TO TM-57 BOARD
CN003
GND
PWR ON
UNSWD 6V
4.8V AC
4.8V AC
UNSWD -30V
CN104
(WHT)
TO SS-34 BOARD
CN609
UNSWD 12V
SWD 9V
GND(M)
SWD 12V
GND
CN103
CN104
CN101
CN106
C112
R107
C104
C103
Q103
6.6
9.3
6
R111
R105
SWD 12V


7
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22
A
B
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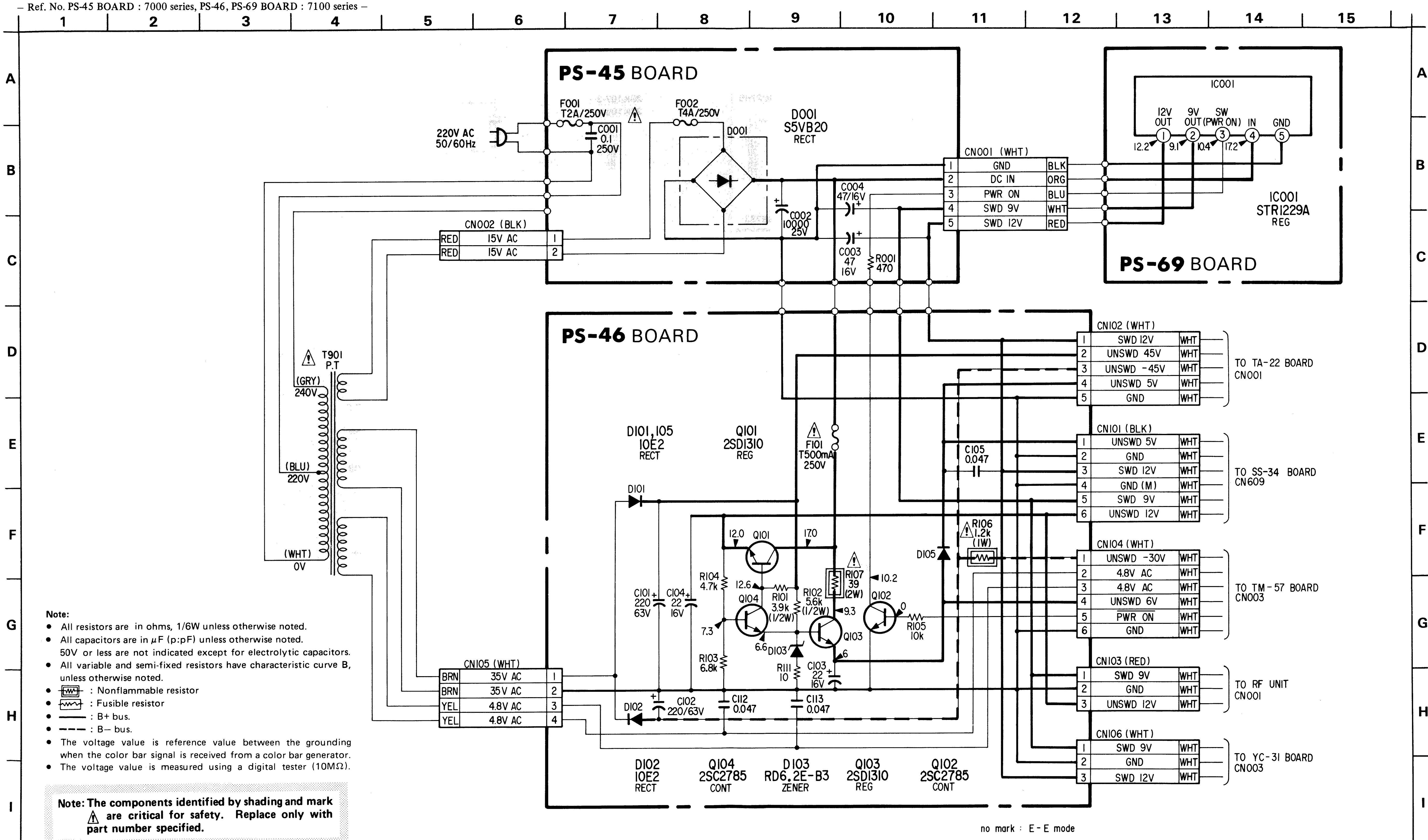
D
E
F
G
H
I
J
T901
P.T
240V (GRY)
220V (BLU)
0V (WHT)
YEL
BRN
BRN
RED
RED
15V AC
15V AC
CN002 (BLK)
-45 BOARD
CN002
F002
F001
D001
C001
C004
C003
CN001
1-613-227-
12
CN001 (WHT)
SWD 9V
DC IN
PWR ON
GND
SWD 12V
SWD 12V
SWD 9V
PWR ON
DC IN
GND
RED
WHT
BLU
ORG
BLK
PS-69 BOARD
1-613-940-
IC001
12.2
9.1
10.4
17.2
no mark : E-E mode
TO YC-31 BOARD CN003
WHT
WHT
WHT
SWD 9V
GND
SWD 12V
CN106 (WHT)
TO RF UNIT CN001
UNSWD 12V
GND
SWD 9V
CN103 (RED)
TO TM-57 BOARD CN003
GND
PWR ON
UNSWD 6V
4.8V AC
4.8V AC
UNSWD -30V
CN104 (WHT)
TO SS-34 BOARD CN609
UNSWD 12V
SWD 9V
GND(M)
SWD 12V
GND
UNSWD 5V
CN101 (BLK)
TO TA-22 BOARD CN001
GND
UNSWD 5V
UNSWD -45V
UNSWD 45V
SWD 12V
CN102 (WHT)
YEL
YEL
BRN
BRN
AC 4.8V
AC 4.8V
AC 35V
AC 35V
CN105 (WHT)
PS-46 BOARD
CN103
CN104
CN101
CN102
CN106
F101
CN105
R106
C112
D105
C105
R107
R104
R101
C113
12.6
17.0
12.0
Q101
C104
R103
C103
Q103
6.6
9.3
6
R111
D103
R102
10.2
0
6.6
12.6
Q104
R105
Q102
7.3
C101
C102
D102
D101
1-613-228-
12
no mark : E-E mode
SWD 12V
GND
PWR ON
DC IN
SWD 9V

PS-45 (POWER SUPPLY), PS-46 (POWER) PS-69 SCHEMATIC DIAGRAM

– Ref. No. PS-45 BOARD : 7000 series, PS-46, PS-69 BOARD : 7100 series –


1
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A
B
C
D
E
F
G
H
I
J
PS-45 BOARD
F001
T2A/250V
F002
T4A/250V
220V AC
50/60Hz
C001
0.1
250V
D001
D001
S5VB20
RECT
C002
10000
25V
C004
47/16V
C003
47
16V
R001
470
CN001 (WHT)
1 GND BLK
2 DC IN ORG
3 PWR ON BLU
4 SWD 9V WHT
5 SWD 12V RED
CN002 (BLK)
RED 15V AC 1
RED 15V AC 2
IC001
12V OUT
9V OUT
SW (PWR ON)
IN
GND
12.2
9.1
10.4
17.2
IC001
STR1229A
REG
PS-69 BOARD
PS-46 BOARD
T901
P.T
(GRY)
240V
(BLU)
220V
(WHT)
0V
D101, 105
10E2
RECT
Q101
2SD1310
REG
F101
T500mA
250V
D101
12.0
Q101
17.0
R104
4.7k
12.6
Q104
R101
3.9k
(1/2W)
R102
5.6k
(1/2W)
R107
39
(2W)
10.2
9.3
Q102
0
R105
10k
Q103
7.3
6.6
D103
6
R103
6.8k
R111
10
C103
22
16V
C101
220
63V
C104
22
16V
C102
220/63V
C112
0.047
C113
0.047
D102
D105
R106
1.2k
(1W)
C105
0.047
CN105 (WHT)
BRN 35V AC 1
BRN 35V AC 2
YEL 4.8V AC 3
YEL 4.8V AC 4
CN102 (WHT)
1 SWD 12V WHT
2 UNSWD 45V WHT
3 UNSWD -45V WHT
4 UNSWD 5V WHT
5 GND WHT
TO TA-22 BOARD
CN001
CN101 (BLK)
1 UNSWD 5V WHT
2 GND WHT
3 SWD 12V WHT
4 GND (M) WHT
5 SWD 9V WHT
6 UNSWD 12V WHT
TO SS-34 BOARD
CN609
CN104 (WHT)
1 UNSWD -30V WHT
2 4.8V AC WHT
3 4.8V AC WHT
4 UNSWD 6V WHT
5 PWR ON WHT
6 GND WHT
TO TM-57 BOARD
CN003
CN103 (RED)
1 SWD 9V WHT
2 GND WHT
3 UNSWD 12V WHT
TO RF UNIT
CN001
CN106 (WHT)
1 SWD 9V WHT
2 GND WHT
3 SWD 12V WHT
TO YC-31 BOARD
CN003
D102
10E2
RECT
Q104
2SC2785
CONT
D103
RD6.2E-B3
ZENER
Q103
2SD1310
REG
Q102
2SC2785
CONT
no mark : E-E mode

Note:

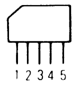
- All resistors are in ohms, 1/6W unless otherwise noted.
- All capacitors are in μF (p:pF) unless otherwise noted. 50V or less are not indicated except for electrolytic capacitors.
- All variable and semi-fixed resistors have characteristic curve B, unless otherwise noted.
- ▭ : Nonflammable resistor
- ⏛ : Fusible resistor
- ——— : B+ bus.
- – – – : B– bus.
- The voltage value is reference value between the grounding when the color bar signal is received from a color bar generator.
- The voltage value is measured using a digital tester (10MΩ).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

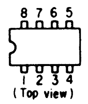
When indicating parts by reference number, please include the board name.

4-6. SEMICONDUCTORS

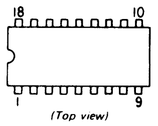
BA634



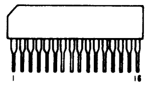
BA4558
HA17558
LM358P
NJM4558D
µPC358C
µPC393C
µPC4558C


8 7 6 5
1 2 3 4
(Top view)

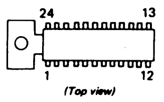
BA5115


18
10
1
9
(Top view)

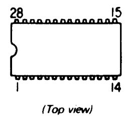
BA7007



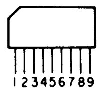
CX134A


24
13
1
12
(Top view)

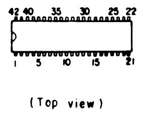
CX862
CX866A
CX866B


28
15
1
14
(Top view)

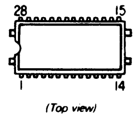
CX894
LA7205



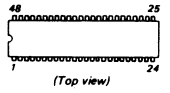
CX10021A-P
CX10021A-NP
CX1021B-P
CX1021B-NP
CX194B-0
CX194B-5
M50160-019SP


42 40 35 30 25 22
1 5 10 15 21
(Top view)

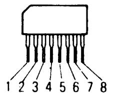
CX10023


28
15
1
14
(Top view)

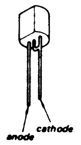
CX20043


48
25
1
24
(Top view)

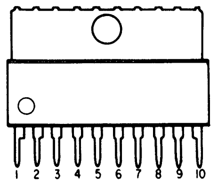
CX20061
CX7926
µPC1373H
µPC1391H



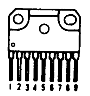
HZT33-02
µPC574J


cathode
anode

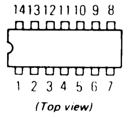
LB1640N


1 2 3 4 5 6 7 8 9 10

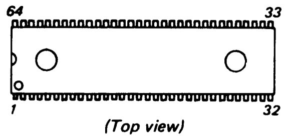
M54543L



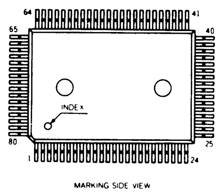
M58653P
MB3614
µPC324C


14 13 12 11 10 9 8
1 2 3 4 5 6 7
(Top view)

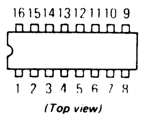
MB88525B-112M


64
33
1
32
(Top view)

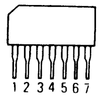
MB88551-133M


64
41
65
40
80
25
1
24
INDEX
MARKING SIDE VIEW

HD14538BP
MB84053B
MC14538BCP
TA7607AP
TC4053BP
TC4538BP
µPD4053BC


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
(Top view)

µPC1513HA



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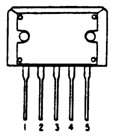
STR1229



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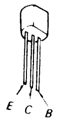
2SA844-C
2SA844-D
2SA844-E
2SC1740S



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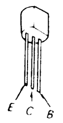
2SB739
2SC1474
2SC1475-13
2SC1475-14
2SC1475-15
2SD788
2SD789



2SA933S
2SA1048-GR
2SA1115
2SC403SP
2SC2458
2SC2603
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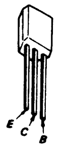
DTA114ES
DTA144ES
DTA144WS
DTC124ES
DTC144ES
DTC144WS



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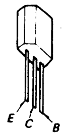

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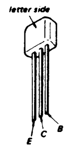
letter side
E C B

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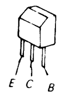
2SD773
2SD774



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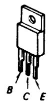

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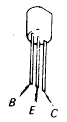

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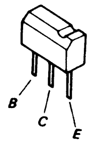

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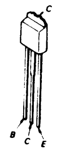

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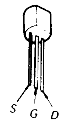
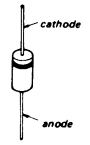
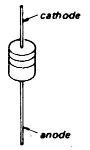
2SK107-3
2SK105A



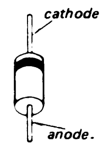
10E2
ERB12-02RK


cathode
anode

1SS119
1SS133
1SS148


cathode
anode

EQA02-06E
EQA02-09D
EQA02-10A
EQA02-10B
HZ10E-B1
HZ10E-B2
HZ10E-B3
HZ6.2E-B3
RD10E-B1
RD10E-B2
RD10E-B3
RD5.1E-B1
RD5.1E-L1
RD5.1E-L2
RD5.1E-L3
RD6.2E-B3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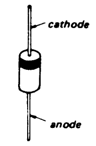
anode.

GP08D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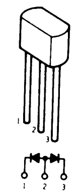
MC911



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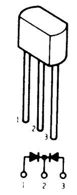

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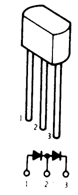

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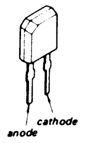
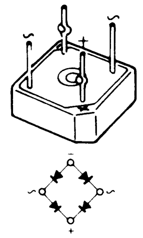
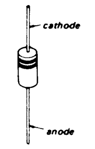

cathode
anode

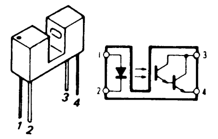
S5VB10
S5VB20



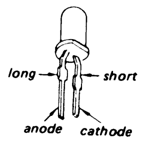
SIB01-02


cathode
anode

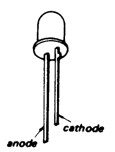
SPI201-22



TLG123A
TLR123
TLR124
TLY123

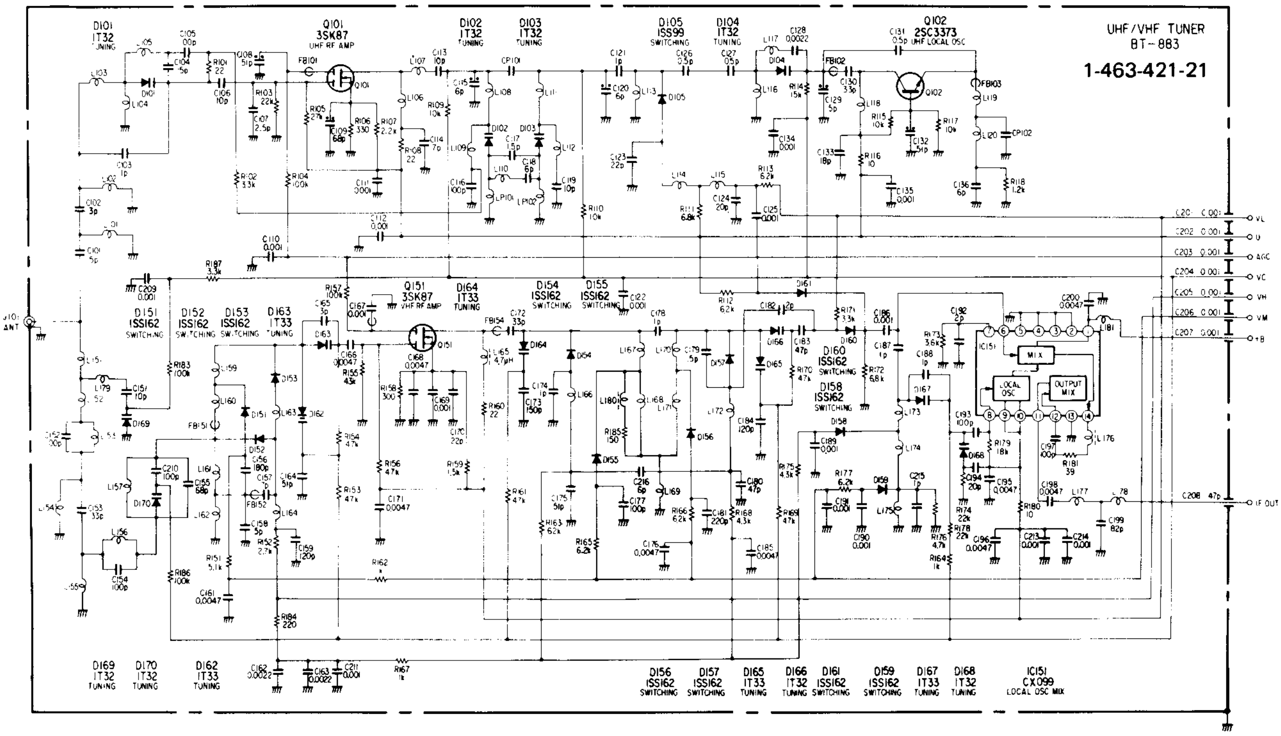

long
short
anode
cathode

SLR-54MC3


anode
cathode

4-7. UHF AND VHF TUNER SCHEMATIC DIAGRAM

– BT-883 tuner –



UHF/VHF TUNER
BT-883
1-463-421-21
Q101 3SK87 UHF RF AMP
Q102 2SC3373 UHF LOCAL OSC
Q151 3SK87 VHF RF AMP
D101 1T32 TUNING
D102 1T32 TUNING
D103 1T32 TUNING
D105 1SS99 SWITCHING
D104 1T32 TUNING
D151 1SS162 SWITCHING
D152 1SS162 SWITCHING
D153 1SS162 SWITCHING
D163 1T33 TUNING
D164 1T33 TUNING
D154 1SS162 SWITCHING
D155 1SS162 SWITCHING
D160 1SS162 SWITCHING
D158 1SS162 SWITCHING
D169 1T32 TUNING
D170 1T32 TUNING
D162 1T33 TUNING
D156 1SS162 SWITCHING
D157 1SS162 SWITCHING
D165 1T33 TUNING
D166 1T32 TUNING
D161 1SS162 SWITCHING
D159 1SS162 SWITCHING
D167 1T33 TUNING
D168 1T32 TUNING
IC151 CX099 LOCAL OSC MIX
MIX
LOCAL OSC
OUTPUT MIX
VL
U
AGC
VC
VH
VM
+B
IF OUT
ANT

Note: Tuner reference numbers are not included in the Electrical Parts List.

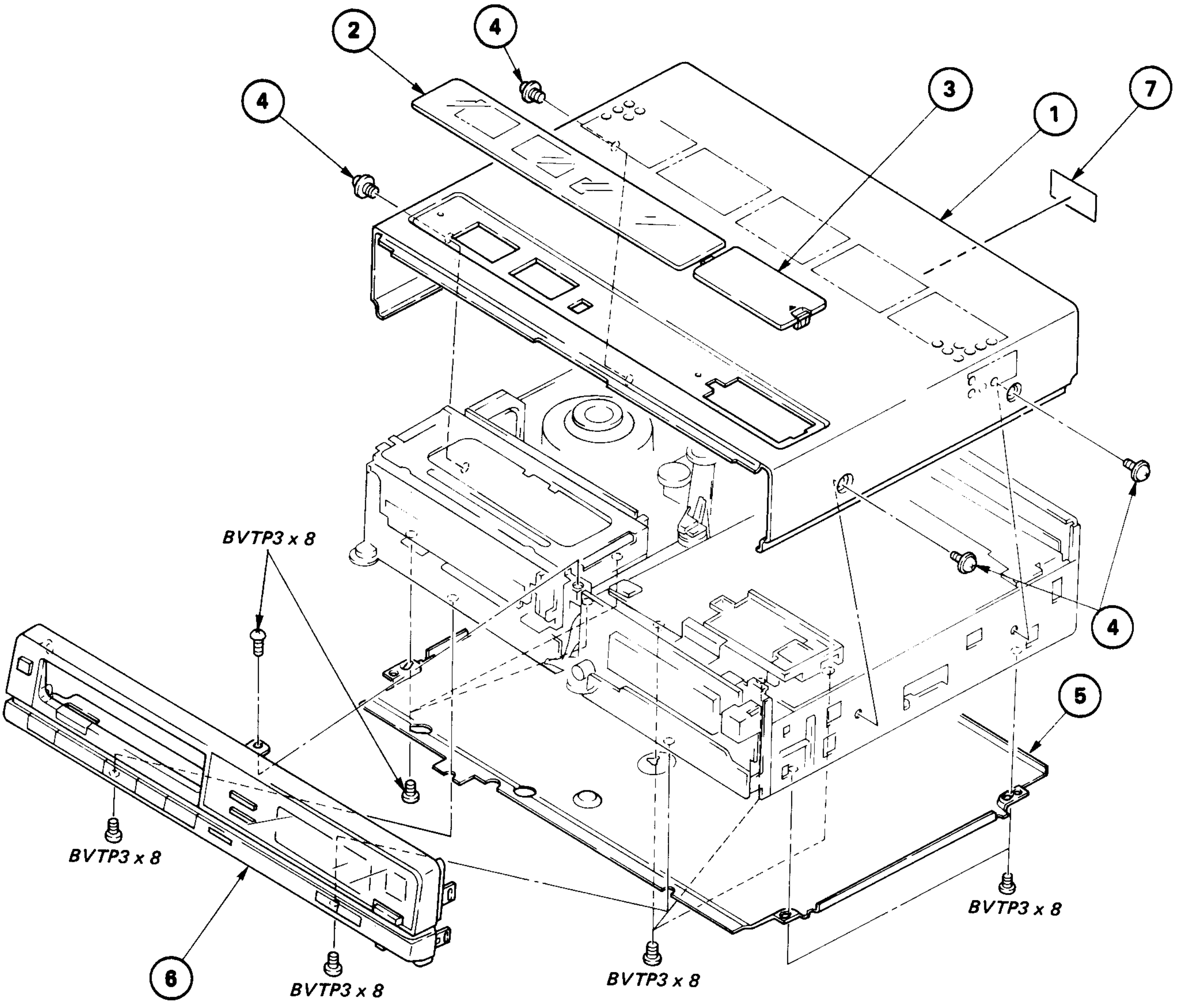
SECTION 5
EXPLODED VIEWS

NOTE:

- Itmes with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

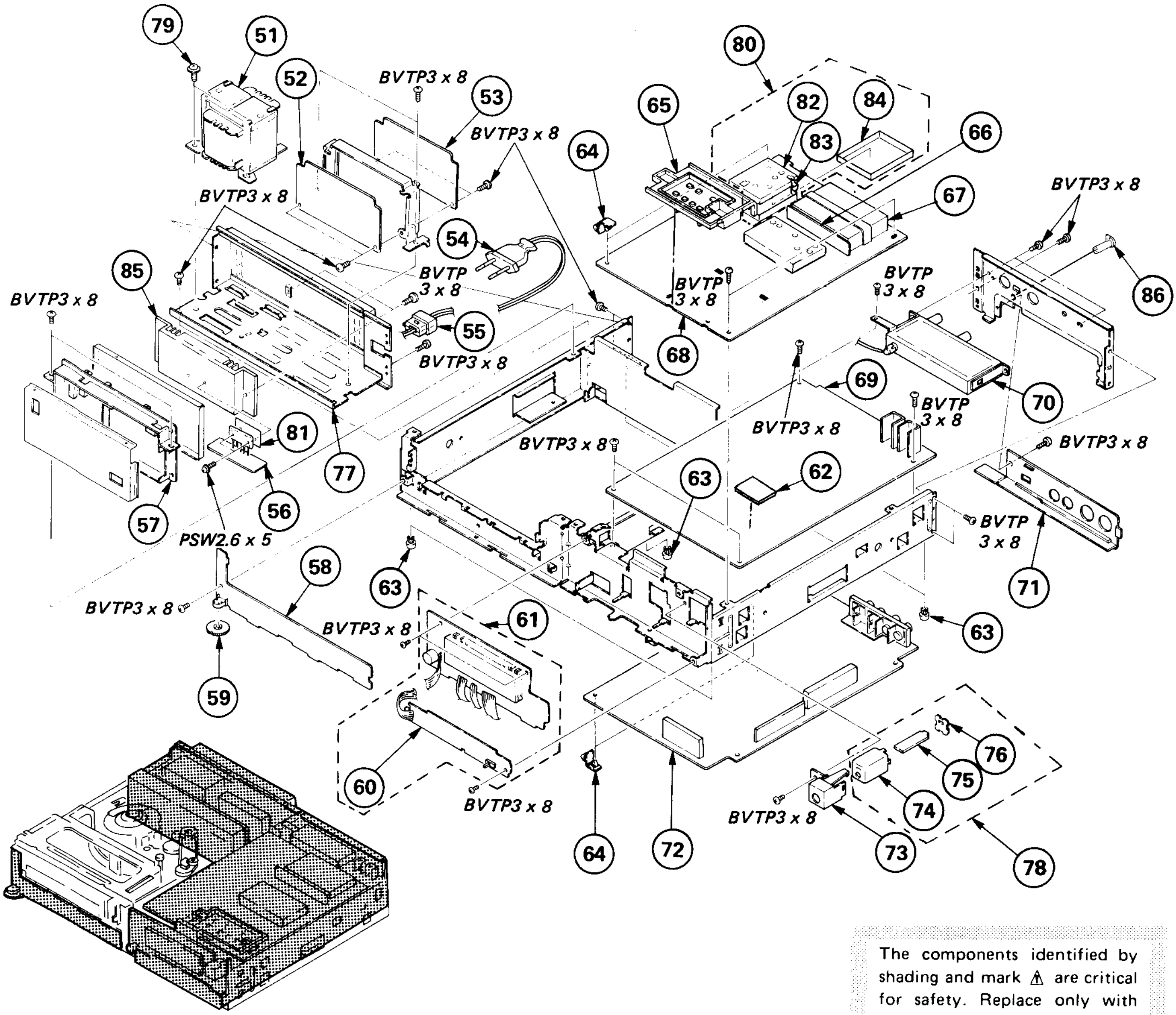
The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

5-1. FRONT PANEL AND CABINET ASSEMBLIES



No.	Part No.	Description	Remark
1	X-3687-504-1	CASE ASSY, UPPER (GRAY)	2
	X-3687-521-1	CASE ASSY, UPPER (SILVER)	2
2	3-684-184-01	PLATE, TRANSPARENT	
3	X-3684-146-1	LID ASSY, PRESET	
4	4-886-821-01	SCREW, M3 CASE (GRAY MODEL)	
	4-886-821-11	SCREW, M3 CASE (SILVER MODEL)	
5	*X-3684-133-1	PLATE ASSY, BOTTOM	
6	X-3687-509-1	PANEL ASSY, FRONT (GRAY)	
	X-3687-526-1	PANEL ASSY, FRONT (SILVER)	
7	*3-687-505-01	LABEL, MODEL NUMBER	

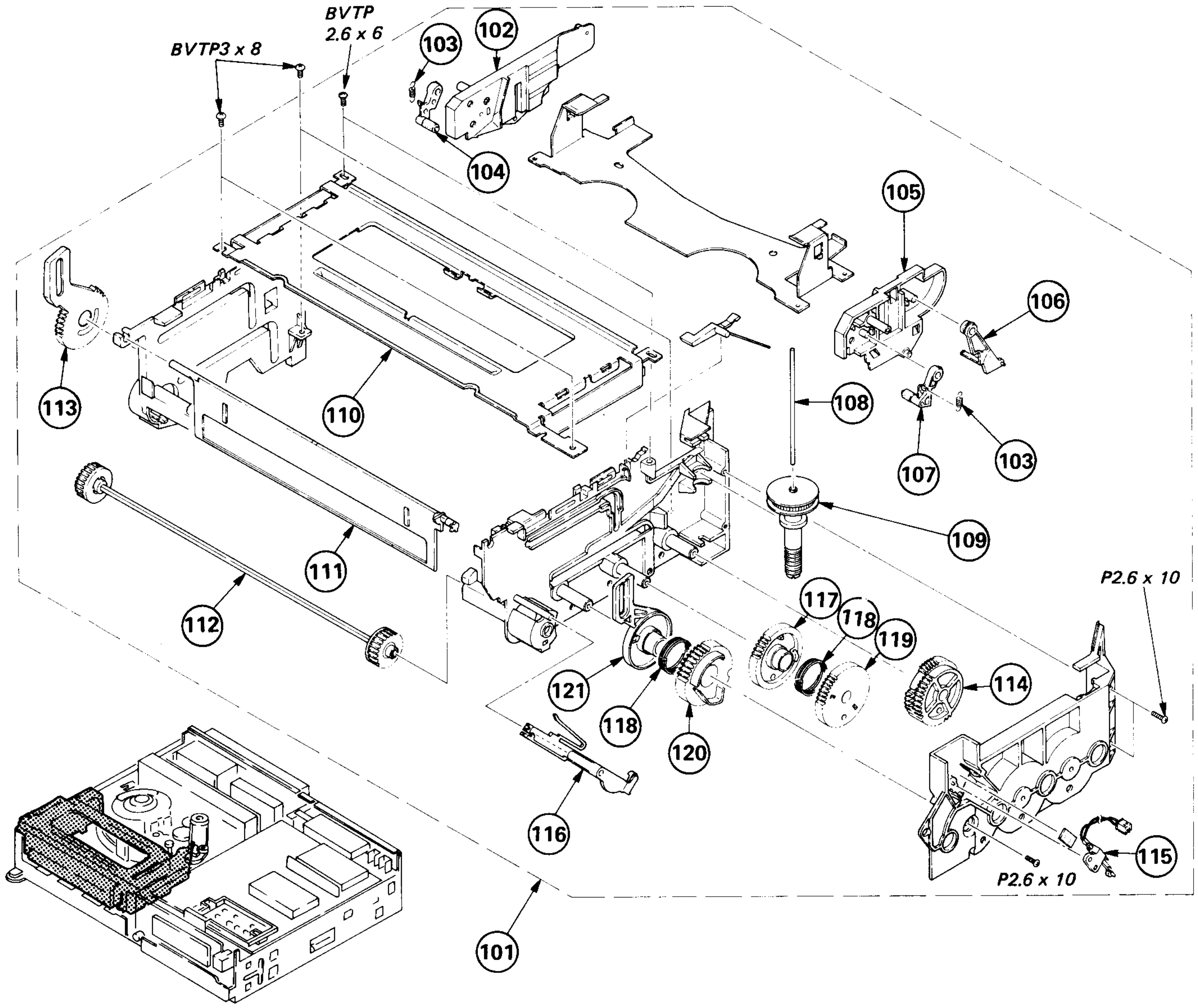
5-2. TUNER, TIMER AND POWER ASSEMBLIES


79
51
52
BVTP3 x 8
53
BVTP3 x 8
80
65
82
84
66
83
64
67
BVTP3 x 8
BVTP3 x 8
54
BVTP 3 x 8
85
BVTP3 x 8
BVTP 3 x 8
55
BVTP3 x 8
68
BVTP 3 x 8
86
69
70
81
BVTP3 x 8
BVTP 3 x 8
BVTP3 x 8
BVTP3 x 8
77
63
62
57
56
PSW2.6 x 5
BVTP 3 x 8
71
58
63
BVTP3 x 8
BVTP3 x 8
61
63
59
60
BVTP3 x 8
BVTP3 x 8
76
75
74
64
72
73
78

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

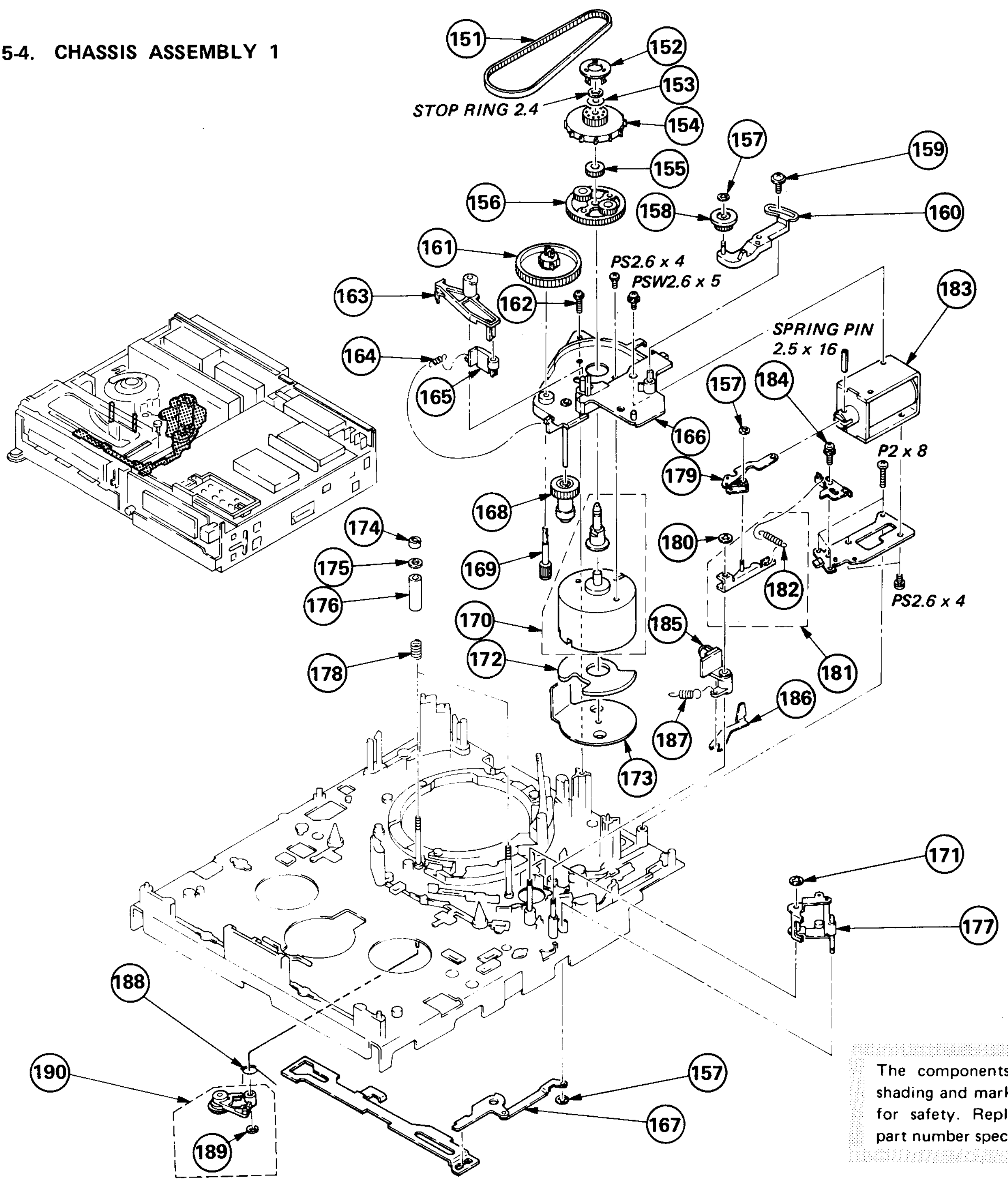
No.	Part No.	Description	Remark
51	⚠1-447-894-11	TRANSFORMER, POWER (T901)	
52	*1-613-228-11	PS-46 BOARD	
53	*1-613-227-11	PS-45 BOARD	
54	⚠1-551-908-41	CORD, POWER	
55	⚠3-703-244-02	BUSHING, CORD	
56	*1-613-940-11	PS-69 BOARD	
57	*A-6711-534-A	RP-20 BOARD, COMPLETE	
58	*1-613-224-11	FU-35 BOARD	
59	3-687-561-01	KNOB, TRACK CONTROL	
60	*1-613-222-11	TM-70 BOARD	
61	*A-6707-439-A	TM BOARD, COMPLETE	60
62	*1-614-220-11	ES-3 BOARD	
63	3-670-155-11	LEG	
64	*3-701-832-00	HINGE, CIRCUIT BOARD	
65	X-3687-501-1	COVER ASSY, PRESET	
66	*1-613-234-11	MT-10 BOARD	
67	⚠1-463-421-21	TUNER, ET (BT-883)(TU001)	
68	*A-6721-205-A	TA-22 BOARD, COMPLETE	66, 67, 80, 85-88
69	*A-6715-226-A	SS-34 BOARD, COMPLETE	
70	⚠1-464-388-11	BOOSTER MIXER, RF MODULATOR (RFU-821)	
71	*3-687-535-01	PLATE, CONNECTOR	
72	*A-6711-535-A	YC-31 BOARD, COMPLETE	
73	*3-684-182-01	FRAME, FITTING, RAY CATCHER	
74	*4-342-117-00	CASE, SHIELD (MAIN), R	
75	*1-606-794-00	N BOARD	
76	*4-342-118-00	LID, SHIELD CASE, R	
77	X-3687-502-1	FRAME ASSY, POWER	
78	A-6734-213-A	CATCHER BLOCK ASSY, RAY	74-76
79	4-886-821-11	SCREW, M3 CASE	
80	*X-3687-527-1	LID ASSY, BOTTOM, SHIELD CASE, AU	82-84
81	3-687-589-01	SHEET, RADIATION	
82	*3-687-550-01	CASE (UPPER LID), SHIELD, AU	
83	*3-687-558-01	CASE (MAIN), SHIELD, AU	
84	*3-687-559-01	CASE (BOTTOM LID), SHIELD, AU	
85	*3-687-588-01	HEAT SINK (K)	
86	3-670-149-00	KNOB, V SYNCHRONOUS	

5-3. FRONT LOADING ASSEMBLY


BVTP3 x 8
BVTP 2.6 x 6
103
102
104
105
106
113
110
108
107
103
109
111
112
P2.6 x 10
117
118
119
114
121
118
120
116
115
P2.6 x 10
101

No.	Part No.	Description	Remark
101	A-6751-186-A	LOADING BLOCK ASSY, FRONT	102-121
102	*X-3684-117-1	PLATE ASSY, SIDE, BASE (LEFT)	
103	3-684-258-01	SPRING, TENSION	
104	X-3684-125-1	RETAINER (LEFT) ASSY, CASSETTE	
105	*X-3684-118-1	PLATE ASSY, SIDE, RIGHT	
106	*3-684-108-01	ARM, LID OPEN	
107	X-3684-124-1	RETAINER (RIGHT) ASSY, CASSETTE	
108	3-679-123-00	SHAFT, GEAR, WORM	
109	3-684-164-01	GEAR, WORM	
110	*3-684-195-01	PLATE, TOP	
111	3-684-168-01	DOOR	
112	X-3684-116-1	SHAFT ASSY, MIDWAY GEAR	
113	*3-684-166-01	ARM (LEFT), DRIVING	
114	X-3684-123-1	GEAR ASSY, DRIVING	
115	1-554-840-11	SWITCH, LEAF (CASSETTE ON)(S904)	
116	3-684-162-01	ARM, SWITCHING, DOOR	
117	3-684-111-01	GEAR (B), LIMITER	
118	3-684-115-01	SPRING	
119	3-684-109-01	GEAR (A), LIMITER	
120	3-684-163-01	GEAR, DRIVING ARM	
121	3-684-165-01	ARM (RIGHT), DRIVING	

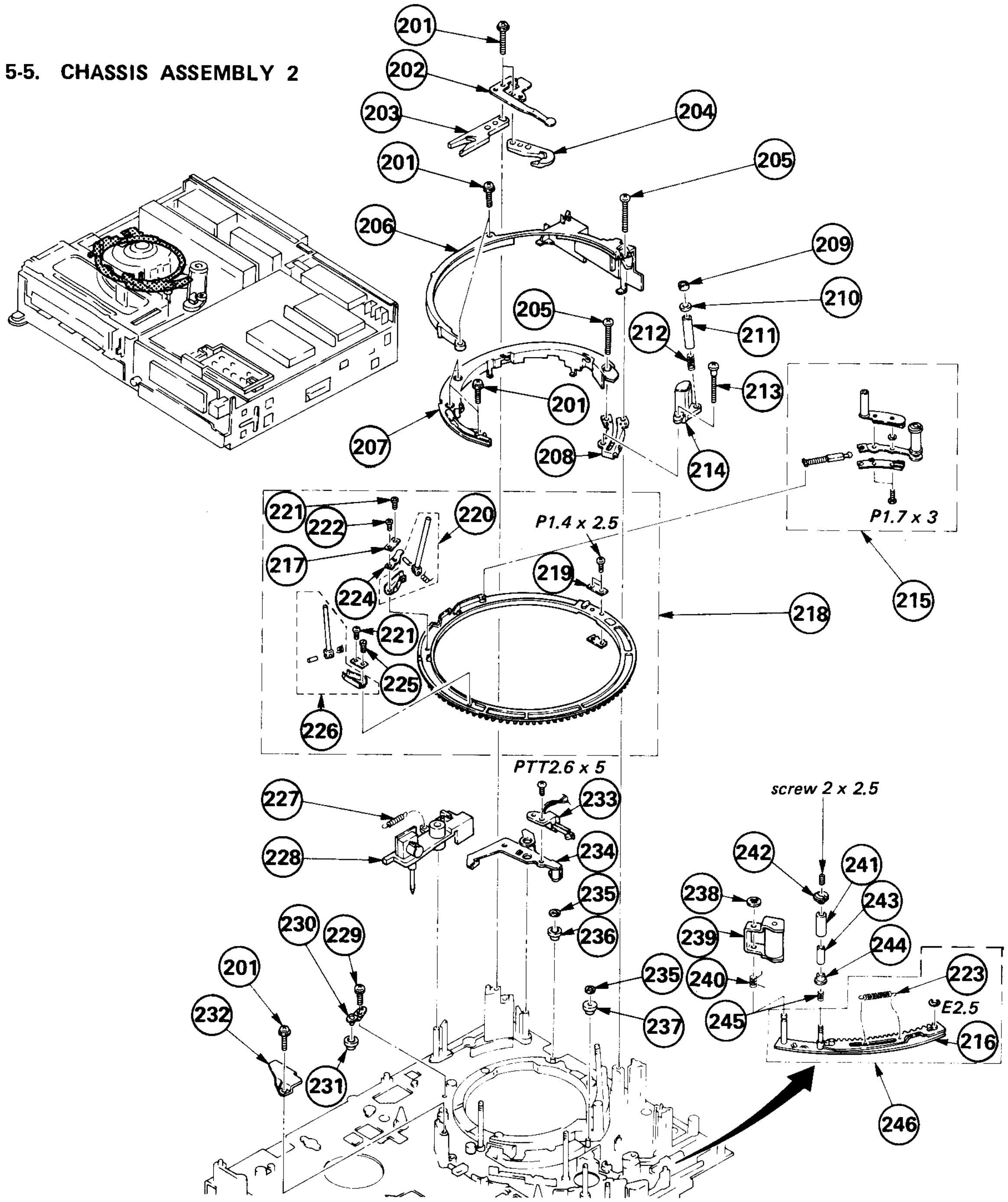
5-4. CHASSIS ASSEMBLY 1


151
152
153
STOP RING 2.4
154
155
156
157
158
159
160
161
PS2.6 x 4
PSW2.6 x 5
162
163
164
165
166
SPRING PIN
2.5 x 16
183
157
184
179
P2 x 8
168
174
175
176
169
180
182
PS2.6 x 4
170
185
172
178
181
186
187
173
171
177
188
190
157
167
189

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark
151	3-684-264-01	BELT, TIMING	
152	3-684-152-01	FLANGE, INTERNAL GEAR	
153	3-683-454-01	WASHER, POLYETHYLENE	
154	3-684-178-01	GEAR, INTERNAL	
155	3-679-104-05	GEAR	
156	X-3679-111-0	CARRIER ASSY	
157	3-669-465-00	WASHER (1.5), STOPPER	
158	3-684-151-01	GEAR	
159	3-681-231-00	SCREW (+PW 2.6X8), TAPPING	
160	X-3684-119-1	ARM ASSY, GEAR	
161	3-679-115-00	GEAR (LARGE), LOADING	
162	3-669-480-11	+ PTPWH 2	
163	3-684-167-01	ARM, STOPPER	
164	3-684-227-01	SPRING, TENSION	
165	3-684-116-01	LIMITER, STOPPER	
166	X-3684-129-1	CHASSIS ASSY, PLANET GEAR	
167	*X-3684-114-1	LEVER ASSY, COMMUNICATION	
168	X-3669-321-0	GEAR (C) ASSY	
169	3-679-114-00	GEAR (SMALL), LOADING	
170	X-3679-268-1	MOTOR ASSY, L (LOADING/THREADING)(M904)	
171	3-669-596-00	WASHER (2.3), STOPPER	
172	*1-605-071-00	LM-8 BOARD	
173	*3-669-613-00	INSULATOR, L MOTOR	
174	3-669-318-21	NUT, ADJUSTMENT, GUIDE	
175	3-684-135-01	WASHER (UPPER), GUIDE, #7, 8	
176	3-684-133-01	SLEEVE, GUIDE, #7, 8	
177	X-3684-113-1	ARM ASSY, PINCH PRESS	
178	3-684-290-01	SPRING, COMPRESSION	
179	X-3684-109-1	ARM ASSY, PINCH SOLENOID	
180	3-669-595-00	WASHER (2), STOPPER	
181	*X-3684-112-1	ARM ASSY, PINCH LIMITER	182
182	3-515-170-00	SPRING, TENSION	
183	⚠1-454-349-41	SOLENOID, PLUNGER (PINCH)(PM901)	
184	3-669-607-00	+PSW (SMALL ROUND) 2.6	
185	1-464-329-31	SENSOR, T COIL (L902)	
186	*3-684-119-01	LINK, TAKE-UP SENSOR	
187	3-684-157-04	SPRING (T SENSOR), TENSION	
188	3-681-154-00	SPRING, TORSION	
189	3-701-436-11	WASHER, 1.6	
190	X-3687-503-1	ARM ASSY, REVIEW BRAKE	189

5-5. CHASSIS ASSEMBLY 2


201
202
203
204
201
205
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209
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205
212
211
213
201
207
208
214
215
P1.7 x 3
221
222
220
P1.4 x 2.5
217
219
224
218
221
225
226
PTT2.6 x 5
screw 2 x 2.5
227
233
228
234
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E2.5
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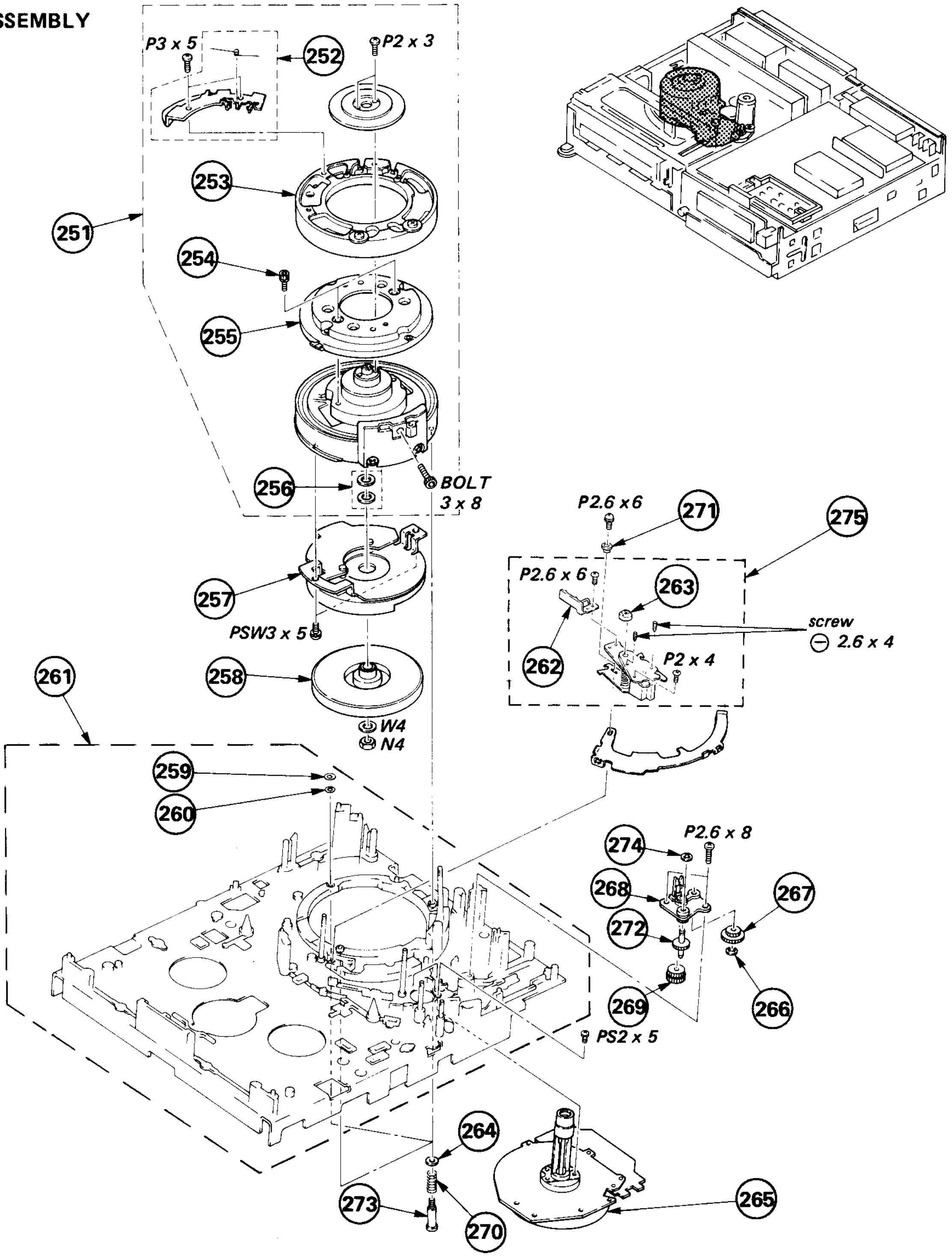
No.	Part No.	Description	Remark
201	3-669-480-11	+ PTPWH 2	
202	*3-684-158-01	PLATE, GROUND, TAPE GUIDE	
203	*3-669-618-00	PLATE (2), ADJUST	
204	*3-672-507-00	PLATE (3-1), ADJUSTMENT	
205	3-669-466-21	SCREW (M 2.6)	
206	3-684-217-01	GUIDE (2), SHUTTLE	
207	*3-679-290-00	GUIDE (1-YA), SHUTTLE	
208	*X-3679-263-1	BASE ASSY, SLANT	
209	3-669-446-00	NUT, GUIDE, NO. 6	
210	3-679-910-00	FLANGE (S), GUIDE, NUMBER 6	
211	3-669-445-00	SPACER, GUIDE, NO. 6	
212	3-669-615-00	SPRING, COMPRESSION	
213	3-669-606-00	SCREW (2.6)	
214	8-825-508-10	HEAD, FE (FULL ERASE HEAD)	
215	A-6750-158-B	SHUTTLE (2) BLOCK ASSY	
216	*X-3679-265-1	SLIDER ASSY (2), T	
217	*3-669-472-02	RETAINER, SPRING, LEAF	
218	X-3679-150-0	RING (YA) ASSY, S LOADING	217, 219-222 224-226
219	*3-669-616-00	RETAINER	
220	*X-3669-430-0	HOLDER BLOCK ASSY, #3 GUIDE	
221	3-669-478-00	SCREW (1X3), TAPPING	
222	3-669-479-11	SCREW (1.4X3.5), TAPPING	
223	3-549-014-00	SPRING, TENSION	
224	3-672-583-00	SPRING	
225	3-672-586-00	SCREW (1.4X3), TAPPING	
226	*X-3669-429-0	HOLDER BLOCK ASSY, #2 GUIDE	
227	3-684-161-01	SPRING (S SENSOR), TENSION	
228	1-464-330-11	SENSOR, S COIL (L901)	
229	3-669-607-31	+PSW (SMALL ROUND) (2.6)	
230	*X-3669-329-0	PLATE ASSY, ADJUSTMENT	
231	3-669-360-00	ROLLER, RING	
232	3-669-476-04	PLATE, GUIDE	
233	1-554-840-11	SWITCH, LEAF (THREADING END) (S903)	
234	*X-3684-130-1	ARM ASSY, LOCK	
235	3-669-465-00	WASHER (1.5), STOPPER	
236	3-669-630-00	ROLLER (C), RING	
237	3-669-597-00	ROLLER (B), RING	
238	3-669-596-00	WASHER (2.3), STOPPER	
239	X-3679-264-1	ARM ASSY, PINCH ROLLER	
240	3-683-441-01	SPRING	
241	3-676-649-11	ROLLER (#9), GUIDE	
242	3-676-650-00	FLANGE (UPPER) (#9), GUIDE	
243	3-672-559-00	SLEEVE, GUIDE	
244	3-672-558-00	FLANGE (LOWER) (#9), GUIDE	
245	3-669-452-00	SPRING, COMPRESSION	
246	A-6750-165-A	GEAR ASSY, SLIDER	216, 223

5-6. DRUM ASSEMBLY


P3 x 5
252
P2 x 3
253
251
254
255
256
BOLT
3 x 8
257
PSW3 x 5
261
258
W4
N4
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260
P2.6 x6
271
275
P2.6 x 6
263
screw
⊖ 2.6 x 4
262
P2 x 4
274
P2.6 x 8
268
267
272
269
266
PS2 x 5
264
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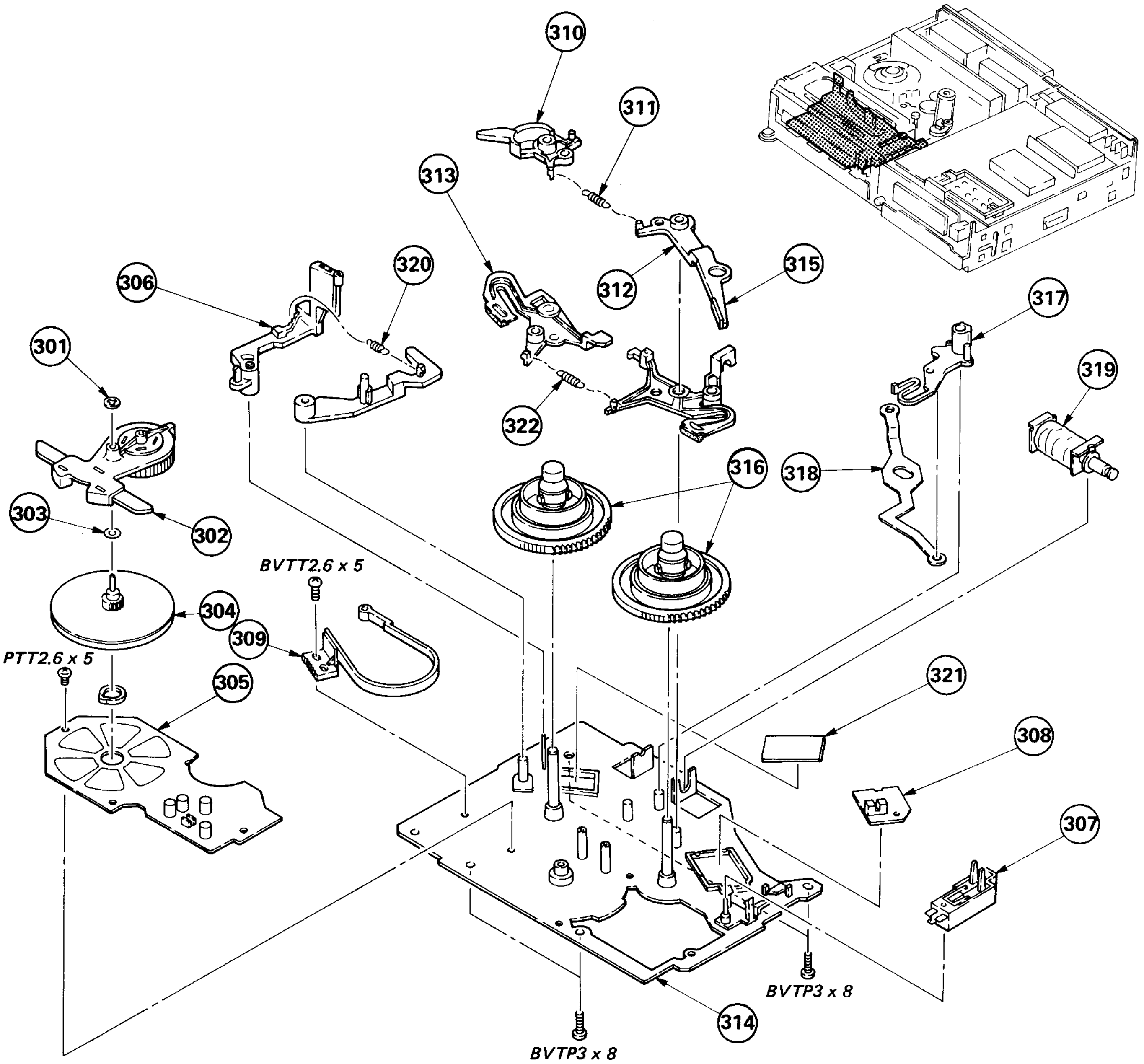
273
270

No.	Part No.	Description	Remark
251	A-6050-282-A	DRUM ASSY (DSH-52A-R)	252-256
252	A-6760-066-B	SPRING ASSY, TAPE RETAINER	
253	A-6760-138-A	DRUM ASSY, UPPER	
254	3-669-157-00	BOLT (WASHER)(2.6X8)	
255	A-6762-190-A	DISK ASSY	
256	X-3669-105-0	SPACE BLOCK ASSY	
257	X-2621-204-2	STATOR ASSY, D	
258	X-2621-202-0	ROTOR ASSY, D	
259	3-669-646-00	SPACER, DRUM	
260	3-669-646-11	SPACER, DRUM	
261	*X-3687-505-1	CHASSIS ASSY, MECHANICAL	259, 260
262	3-684-140-01	PROTECTOR	
263	*3-684-246-02	NUT, ADJUSTMENT, HEIGHT, ACE	
264	3-669-600-11	WASHER, FLAT(3.5)	
265	8-838-080-01	MOTOR, DC(BHF-1908B)(CAPSTAN MOTOR)(M902)	
266	3-669-465-00	WASHER (1.5), STOPPER	
267	3-669-337-00	GEAR (D)	
268	X-3679-147-0	CHASSIS (B) ASSY, DRIVE GEAR	
269	3-669-338-00	GEAR (E)	
270	3-429-123-00	SPRING	
271	3-684-247-01	BUSHING, ACE	
272	X-3684-166-1	GEAR(F) ASSY(C)	
273	3-669-302-00	SCREW, FITTING	
274	3-669-595-00	WASHER (2), STOPPER	
275	A-6761-075-A	ACE ASSY	262, 263

5-7. REEL BLOCK ASSEMBLY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322
316
318
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302
BVTT2.6 x 5
304
309
PTT2.6 x 5
305
321
308
307
BVTP3 x 8
314
BVTP3 x 8

No.	Part No.	Description	Remark
301	3-669-595-00	WASHER (2), STOPPER	
302	A-6759-074-A	ARM BLOCK ASSY, PENDULUM	
303	3-679-318-00	WASHER, PENDULUM ARM	
304	X-2622-201-0	ROTOR ASSY, R	
305	*A-4910-049-A	R STATOR BOARD,COMPLETE(REEL MOTOR)(M903)	
306	X-3684-121-1	LEVER ASSY, TENSION REGULATOR	
307	1-554-839-11	SWITCH, LEAF (2 GANG)(S901) (REC PROOF/CASSETTE DOWN)	
308	*1-613-233-11	RD-21 BOARD	
309	X-3679-120-0	BAND ASSY, TENSION REGULATOR	
310	3-684-192-01	ARM, BRAKE, SUPPLY SOFT	
311	3-684-235-01	SPRING, TENSION	
312	X-3684-137-1	BRAKE ASSY, T SOFT	
313	X-3684-107-1	BRAKE ASSY, SUPPLY	
314	*X-3684-131-1	CHASSIS ASSY, SUB	
315	X-3684-108-1	BRAKE ASSY, TAKE-UP	
316	X-3684-106-1	TABLE ASSY, REEL	
317	3-684-193-01	ARM, PENDULUM STOPPER	
318	*3-684-183-01	LINK, L	
319	⚠1-454-371-31	SOLENOID, PLUNGER (BRAKE)(PM902)	
320	3-679-151-00	SPRING, TENSION	
321	*1-613-232-11	RD-20 BOARD	
322	3-685-772-01	SPRING, TENSION	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

5-8. HARDWARE LIST

SCREW

7-621-770-67	SCREW +P 2.6X6
7-621-759-35	+PSW, 2.6X5
7-621-759-85	+PSW, 2.6X12
7-627-551-28	SCREW, PRECISION +P 1.4X2.5
7-627-552-38	SCREW, PRECISION +P 1.7X3
7-627-553-18	SCREW, PRECISION +P 2X2
7-627-553-47	SCREW, PRECISION +P 2X4
7-628-253-15	SCREW +PS 2X5
7-628-253-95	SCREW +PS 2.6X4
7-628-254-15	SCREW +PS 2.6X6
7-685-134-14	SCREW +P 2.6X8 TYPE2 NON-SLIT
7-685-135-14	SCREW +P 2.6X10 TYPE2 NON-SLIT
7-685-645-71	SCREW +BVTP 3X6 TYPE2 IT-3
7-685-645-81	SCREW +BVTP 3X6 TYPE2
7-685-646-71	SCREW +BVTP 3X8 TYPE2 IT-3
7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3
7-685-646-81	SCREW +BVTP 3X8 TYPE2
7-685-646-89	SCREW +BVTP 3X8 TYPE2
7-685-790-04	SCREW +PTT 2.6X4 (S)
7-685-791-04	SCREW +PTT 2.6X5 (S)
7-685-791-04	SCREW +BVTT 2.6X5 (S)

SET-SCREW

7-621-710-25	SET-SCREW, SLOT 2X3 CONE POINT
7-621-731-08	SET-SCT, HEX. 2X2.5, FLAT POINT
7-621-732-08	SET-SCT, HEX. 2X3 FLAT POINT
7-683-174-21	SET-SCREW, SLOT 3X4 CONE POINT

RING

7-624-118-01	RING, RETAINING E-2.5
7-624-190-61	STOP RING 2.4, TYPE-CS

TAPPING

7-685-105-14	TPG +P 2X8, TYPE 2, NON-SLIT

SECTION 6
ELECTRICAL PARTS LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

RESISTORS
- All resistors are in ohms
- F : nonflammable

- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

CAPACITORS
- MF : μF, PF : μμF

COILS
- MMH : mH, UH : μH

Ref.No	Part No.	Description			Remark
	*A-4910-049-A	R STATOR BOARD, COMPLETE (REEL MOTOR) ***************************************			
	*1-560-460-00	PIN, CONNECTOR 4P			
		CAPACITOR			
C1	1-123-821-00	ELECT	47MF	20%	16V
C2	1-123-821-00	ELECT	47MF	20%	16V
C3	1-123-821-00	ELECT	47MF	20%	16V
C4	1-123-821-00	ELECT	47MF	20%	16V
		DIODE			
D1	8-719-941-48	DIODE 1N4148TP			
		IC			
IC1	8-759-108-77	IC CX877			
		TRANSISTOR			
Q1	8-729-100-01	TRANSISTOR 2SD992-N			
Q2	8-729-100-01	TRANSISTOR 2SD992-N			
Q3	8-729-100-01	TRANSISTOR 2SD992-N			
Q4	8-729-100-01	TRANSISTOR 2SD992-N			
Q5	8-729-100-01	TRANSISTOR 2SD992-N			
Q6	8-729-100-01	TRANSISTOR 2SD992-N			
		RESISTOR			
R1	1-247-823-00	CARBON	470	5%	1/6W
R2	1-247-823-00	CARBON	470	5%	1/6W
R3	1-247-823-00	CARBON	470	5%	1/6W
R4	1-247-829-00	CARBON	820	5%	1/6W
R5	1-247-871-00	CARBON	47K	5%	1/6W
R6	1-247-871-00	CARBON	47K	5%	1/6W
R7	1-247-871-00	CARBON	47K	5%	1/6W
R8	1-247-871-00	CARBON	47K	5%	1/6W
		DIODE			
S1	8-719-810-31	DIODE THS103-1			
S2	8-719-810-31	DIODE THS103-1			

****

Ref.No	Part No.	Description			Remark
	*A-6707-439-A	TM BOARD, COMPLETE *******************			
		CAPACITOR			
C001	1-123-382-00	ELECT	3.3MF	20%	50V
C003	1-125-299-00	DOUBLE LAYER	47000MF		5.5V
C004	1-161-773-00	CERAMIC	0.1MF	20%	25V
C005	1-102-525-00	CERAMIC	68PF	5%	50V
C006	1-102-852-00	CERAMIC	47PF	5%	50V
C008	1-123-357-00	ELECT	22MF	20%	50V
C009	1-161-055-00	CERAMIC	0.022MF	10%	50V
C010	1-161-055-00	CERAMIC	0.022MF	10%	50V
C011	1-161-773-00	CERAMIC	0.1MF	20%	25V
C012	1-123-308-00	ELECT	220MF	20%	10V
		DIODE			
D001	8-719-812-31	DIODE TLR123			
D002	8-719-911-19	DIODE 1SS119			
D003	8-719-911-19	DIODE 1SS119			
D004	8-719-162-07	DIODE RD6.2E-B			
D005	8-719-162-07	DIODE RD6.2E-B			
		FLUORESCENT INDICATOR			
FL001	1-519-322-11	INDICATOR, FLUORESCENT			
		IC			
IC001	8-759-911-09	IC MB88525B-112M			
IC002	8-759-913-41	IC S-8054ALB			
		COIL			
L001	1-407-492-00	MICRO INDUCTOR 1MMH			
L002	1-407-177-XX	MICRO INDUCTOR 470UH			
		TRANSISTOR			
Q001	8-729-245-83	TRANSISTOR 2SC2458			
Q002	8-729-245-83	TRANSISTOR 2SC2458			
Q003	8-729-204-83	TRANSISTOR 2SA1048-GR			
Q004	8-729-900-89	TRANSISTOR DTC144ES			
Q005	8-729-245-83	TRANSISTOR 2SC2458			
		RESISTOR			
R001	1-247-867-00	CARBON	33K	5%	1/6W
R002	1-247-874-00	CARBON	62K	5%	1/6W
R003	1-247-872-00	CARBON	51K	5%	1/6W
R004	1-247-873-00	CARBON	56K	5%	1/6W
R005	1-247-869-00	CARBON	39K	5%	1/6W
R006	1-247-885-00	CARBON	180K	5%	1/6W
R007	1-247-879-00	CARBON	100K	5%	1/6W
R008	1-247-867-00	CARBON	33K	5%	1/6W
R010	1-247-879-00	CARBON	100K	5%	1/6W
R024	1-247-867-00	CARBON	33K	5%	1/6W
R025	1-247-833-00	CARBON	1.2K	5%	1/6W
R026	1-247-883-00	CARBON	150K	5%	1/6W
R027	1-247-883-00	CARBON	150K	5%	1/6W
R028	1-247-883-00	CARBON	150K	5%	1/6W
R029	1-247-883-00	CARBON	150K	5%	1/6W
R030	1-247-883-00	CARBON	150K	5%	1/6W
R031	1-247-883-00	CARBON	150K	5%	1/6W
R032	1-247-883-00	CARBON	150K	5%	1/6W
R033	1-247-883-00	CARBON	150K	5%	1/6W
R034	1-247-883-00	CARBON	150K	5%	1/6W
R035	1-247-883-00	CARBON	150K	5%	1/6W
R036	1-247-883-00	CARBON	150K	5%	1/6W
R037	1-247-883-00	CARBON	150K	5%	1/6W
R038	1-247-883-00	CARBON	150K	5%	1/6W

Ref.No	Part No.	Description				Remark
R039	1-247-883-00	CARBON	150K	5%	1/6W	
R040	1-247-883-00	CARBON	150K	5%	1/6W	
R041	1-247-883-00	CARBON	150K	5%	1/6W	
R042	1-247-883-00	CARBON	150K	5%	1/6W	
R043	1-247-883-00	CARBON	150K	5%	1/6W	
R044	1-247-883-00	CARBON	150K	5%	1/6W	
R045	1-247-839-00	CARBON	2.2K	5%	1/6W	
R046	1-247-827-00	CARBON	680	5%	1/6W	
R047	1-247-847-00	CARBON	4.7K	5%	1/6W	
R048	1-247-863-00	CARBON	22K	5%	1/6W	

VARIABLE RESISTOR

RV001	1-228-749-00	RES, ADJ, CARBON 22K

SWITCH

S002	1-554-174-00	SWITCH, KEY BOARD
S004	1-554-174-00	SWITCH, KEY BOARD
S012	1-554-174-00	SWITCH, KEY BOARD

CERAMIC TRIMMER

TC001	1-141-022-21	CAP, TRIMMER, CERAMIC

CRYSTAL

X001	1-567-098-00	VIBRATOR, CRYSTAL

* * *

*1-613-222-11 TM-70 BOARD

SWITCH

S003	1-554-174-00	SWITCH, KEY BOARD
S005	1-554-174-00	SWITCH, KEY BOARD
S006	1-554-174-00	SWITCH, KEY BOARD
S007	1-554-174-00	SWITCH, KEY BOARD
S008	1-554-174-00	SWITCH, KEY BOARD
S009	1-554-174-00	SWITCH, KEY BOARD
S010	1-554-174-00	SWITCH, KEY BOARD
S011	1-554-174-00	SWITCH, KEY BOARD
S013	1-554-377-51	SWITCH, SLIDE

* * *

*A-6711-534-A RP-20 BOARD, COMPLETE

	*3-687-522-01	LID, BOTTOM, SHIELD CASE, RP
	*3-687-533-01	CASE (MAIN), SHIELD, RP

CAPACITOR

Ref.No	Part No.	Description				Remark
C501	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C502	1-123-330-00	ELECT	22MF	20%	16V	
C503	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C504	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C505	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C506	1-123-318-00	ELECT	33MF	20%	10V	
C507	1-161-773-00	CERAMIC	0.1MF	20%	25V	
C508	1-161-773-00	CERAMIC	0.1MF	20%	25V	
C509	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C510	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C511	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C512	1-102-953-00	CERAMIC	18PF	5%	50V	
C513	1-102-953-00	CERAMIC	18PF	5%	50V	
C514	1-123-381-00	ELECT	2.2MF	20%	50V	
C515	1-161-047-00	CERAMIC	0.0047MF	10%	25V	
C516	1-161-055-00	CERAMIC	0.022MF	10%	25V	
C517	1-123-356-00	ELECT	10MF	20%	16V	
C518	1-102-953-00	CERAMIC	18PF	5%	50V	
C519	1-161-013-00	CERAMIC	0.01MF	20%	25V	
C520	1-161-013-00	CERAMIC	0.01MF	20%	25V	
C521	1-123-356-00	ELECT	10MF	20%	16V	
C522	1-102-114-00	CERAMIC	470PF	10%	50V	
C523	1-161-055-00	CERAMIC	0.022MF	10%	25V	
C524	1-161-055-00	CERAMIC	0.022MF	10%	25V	
C525	1-102-953-00	CERAMIC	18PF	5%	50V	
C526	1-161-057-00	CERAMIC	0.033MF	10%	25V	
C527	1-161-773-00	CERAMIC	0.1MF	20%	25V	
C529	1-123-380-00	ELECT	1MF	20%	50V	
C530	1-123-380-00	ELECT	1MF	20%	50V	
C532	1-123-380-00	ELECT	1MF	20%	50V	
C535	1-102-959-00	CERAMIC	22PF	5%	50V	
C537	1-102-947-00	CERAMIC	10PF	5%	50V	
C539	1-161-013-00	CERAMIC	0.01MF	20%	25V	
C542	1-161-013-00	CERAMIC	0.01MF	20%	25V	
C543	1-123-332-00	ELECT	47MF	20%	16V	
C544	1-123-332-00	ELECT	47MF	20%	16V	
C545	1-161-013-00	CERAMIC	0.01MF	20%	25V	
C546	1-131-500-51	TANTALUM	2.2MF	20%	16V	
C547	1-102-114-00	CERAMIC	470PF	10%	50V	
C548	1-102-112-00	CERAMIC	330PF	10%	50V	
C549	1-161-059-00	CERAMIC	0.047MF	20%	50V	
C550	1-161-013-00	CERAMIC	0.01MF	20%	25V	
C553	1-161-059-00	CERAMIC	0.047MF	20%	25V	
C554	1-102-128-00	CERAMIC	0.0082MF	10%	50V	

CONNECTOR

CN501	*1-508-736-21	PIN, CONNECTOR 10P
CN502	*1-564-031-00	PIN, CONNECTOR 6P
CN503	*1-508-846-00	PIN, CONNECTOR 8P
CN504	*1-508-845-00	PIN, CONNECTOR 6P
CN505	*1-564-027-00	PIN, CONNECTOR 2P

IC

IC501	8-758-620-00	IC CX862
IC502	8-759-240-53	IC TC4053BP
IC503	8-751-340-00	IC CX134A

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description	Remark
		COIL	
L501	1-408-454-00	MICRO INDUCTOR 100UH	
L502	1-408-030-00	MICRO INDUCTOR 0.68UH	
L503	1-408-030-00	MICRO INDUCTOR 0.68UH	
L504	1-408-030-00	MICRO INDUCTOR 0.68UH	
L505	1-408-158-00	MICRO INDUCTOR 6.8MMH	
L506	1-408-414-00	MICRO INDUCTOR 27UH	
L507	1-408-158-0	MICRO INDUCTOR 6.8MMH	
L508	1-408-414-00	MICRO INDUCTOR 27UH	
L509	1-408-417-00	MICRO INDUCTOR 47UH	
L512	1-408-454-00	MICRO INDUCTOR 100UH	
L513	1-407-717-00	MICRO INDUCTOR 1MMH	
L514	1-408-462-11	MICRO INDUCTOR 470UH	
L515	1-408-462-11	MICRO INDUCTOR 470UH	
L516	1-408-422-00	MICRO INDUCTOR 120UH	
L517	1-407-495-00	MICRO INDUCTOR 1.8MMH	
		TRANSISTOR	
Q501	8-729-900-36	TRANSISTOR DTC124ES	
Q502	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q503	8-729-177-43	TRANSISTOR 2SD774	
Q504	8-729-245-83	TRANSISTOR 2SC2458	
Q508	8-729-245-83	TRANSISTOR 2SC2458	
Q510	8-729-900-36	TRANSISTOR DTC124ES	
		RESISTOR	
R503	1-247-844-00	CARBON 3.6K 5% 1/6W	
R504	1-247-852-00	CARBON 7.5K 5% 1/6W	
R505	1-247-855-00	CARBON 10K 5% 1/6W	
R506	1-247-831-00	CARBON 1K 5% 1/6W	
R507	1-247-867-00	CARBON 33K 5% 1/6W	
R508	1-247-863-00	CARBON 22K 5% 1/6W	
R509	1-247-863-00	CARBON 22K 5% 1/6W	
R510	1-247-871-00	CARBON 47K 5% 1/6W	
R511	1-247-867-00	CARBON 33K 5% 1/6W	
R512	1-247-867-00	CARBON 33K 5% 1/6W	
R513	1-247-867-00	CARBON 33K 5% 1/6W	
R514	1-247-867-00	CARBON 33K 5% 1/6W	
R515	1-247-831-00	CARBON 1K 5% 1/6W	
R517	1-247-824-00	CARBON 510 5% 1/6W	
R518	1-247-821-00	CARBON 390 5% 1/6W	
R519	1-247-779-00	CARBON 6.8 5% 1/6W	
R520	1-247-822-00	CARBON 430 5% 1/6W	
R521	1-247-855-00	CARBON 10K 5% 1/6W	
R522 ⚠	1-212-855-00	FUSIBLE 8.2 5% 1/4W	F
R523	1-247-839-00	CARBON 2.2K 5% 1/6W	
R524	1-247-839-00	CARBON 2.2K 5% 1/6W	
R525	1-247-839-00	CARBON 2.2K 5% 1/6W	
R526	1-247-839-00	CARBON 2.2K 5% 1/6W	
R527	1-247-831-00	CARBON 1K 5% 1/6W	
R528	1-247-831-00	CARBON 1K 5% 1/6W	
R529	1-247-825-00	CARBON 560 5% 1/6W	

Ref.No	Part No.	Description	Remark
R530	1-247-835-00	CARBON 1.5K 5% 1/6W	
R531 ⚠	1-212-855-00	FUSIBLE 8.2 5% 1/4W	F
R533	1-247-847-00	CARBON 4.7K 5% 1/6W	
R534	1-247-839-00	CARBON 2.2K 5% 1/6W	
R535	1-247-849-00	CARBON 5.6K 5% 1/6W	
R536	1-247-849-00	CARBON 5.6K 5% 1/6W	
R537	1-247-809-00	CARBON 120 5% 1/6W	
R540	1-247-819-00	CARBON 330 5% 1/6W	
R543	1-247-819-00	CARBON 330 5% 1/6W	
R545	1-247-844-00	CARBON 3.6K 5% 1/6W	
R546	1-247-844-00	CARBON 3.6K 5% 1/6W	
R547	1-247-828-00	CARBON 750 5% 1/6W	
R548	1-247-807-00	CARBON 100 5% 1/6W	
R549	1-247-831-00	CARBON 1K 5% 1/6W	
R550	1-247-831-00	CARBON 1K 5% 1/6W	
R551	1-247-835-00	CARBON 1.5K 5% 1/6W	
R552	1-247-835-00	CARBON 1.5K 5% 1/6W	
R557	1-247-815-00	CARBON 220 5% 1/6W	
R559	1-247-839-00	CARBON 2.2K 5% 1/6W	
		VARIABLE RESISTOR	
RV501	1-228-920-00	RES, ADJ, CARBON 2.2K	
RV502	1-228-920-00	RES, ADJ, CARBON 2.2K	
RV503	1-228-920-00	RES, ADJ, CARBON 2.2K	

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*A-6711-535-A YC-31 BOARD, COMPLETE
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*1-536-870-11 TERMINAL BOARD, CONTROL PANEL

Ref.No	Part No.	Description	Remark
		BAND PASS FILTER	
BPF001	1-235-098-00	FILTER, BAND PASS	
		CAPACITOR	
C002	1-123-356-00	ELECT 10MF 20% 16V	
C010	1-123-356-00	ELECT 10MF 20% 16V	
C011	1-123-356-00	ELECT 10MF 20% 25V	
C013	1-123-306-00	ELECT 47MF 20% 10V	
C014	1-123-381-00	ELECT 2.2MF 20% 50V	
C015	1-123-306-00	ELECT 47MF 20% 10V	
C016	1-108-589-00	MYLAR 0.027MF 5% 50V	
C017	1-101-004-00	CERAMIC 0.01MF 50V	
C018	1-123-306-00	ELECT 47MF 20% 10V	
C019	1-101-004-00	CERAMIC 0.01MF 50V	
C020	1-101-004-00	CERAMIC 0.01MF 50V	
C021	1-101-004-00	CERAMIC 0.01MF 50V	
C023	1-101-882-00	CERAMIC 51PF 5% 50V	
C024	1-130-047-00	FILM 180PF 5% 50V	
C025	1-106-172-00	MYLAR 0.001MF 5% 50V	
C026	1-101-059-00	CERAMIC 510PF 5% 50V	
C027	1-161-045-00	CERAMIC 0.0033MF 10% 25V	
C028	1-106-172-00	MYLAR 0.001MF 5% 50V	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description			Remark
C029	1-123-382-00	ELECT	3.3MF	20%	50V
C031	1-101-004-00	CERAMIC	0.01MF		50V
C032	1-102-816-00	CERAMIC	120PF	5%	50V
C033	1-101-004-00	CERAMIC	0.01MF		50V
C034	1-101-004-00	CERAMIC	0.01MF		50V
C035	1-102-816-00	CERAMIC	120PF	5%	50V
C036	1-101-882-00	CERAMIC	51PF	5%	50V
C037	1-101-004-00	CERAMIC	0.01MF		50V
C038	1-101-004-00	CERAMIC	0.01MF		50V
C039	1-101-004-00	CERAMIC	0.01MF		50V
C040	1-101-004-00	CERAMIC	0.01MF		50V
C041	1-161-043-00	CERAMIC	0.0022MF	10%	25V
C042	1-102-516-00	CERAMIC	27PF	5%	50V
C043	1-101-004-00	CERAMIC	0.01MF		50V
C044	1-101-004-00	CERAMIC	0.01MF		50V
C045	1-102-523-00	CERAMIC	56PF	5%	50V
C046	1-101-004-00	CERAMIC	0.01MF		50V
C047	1-101-004-00	CERAMIC	0.01MF		50V
C048	1-101-004-00	CERAMIC	0.01MF		50V
C049	1-101-004-00	CERAMIC	0.01MF		50V
C050	1-102-865-00	CERAMIC	8PF	0.5PF	50V
C051	1-102-525-00	CERAMIC	68PF	5%	50V
C052	1-102-525-00	CERAMIC	68PF	5%	50V
C053	1-123-380-00	ELECT	1MF	20%	50V
C054	1-161-002-00	CERAMIC	0.0012MF	10%	25V
C055	1-123-380-00	ELECT	1MF	20%	50V
C056	1-102-962-00	CERAMIC	30PF	5%	50V
C057	1-102-981-00	CERAMIC	300PF	5%	50V
C058	1-123-306-00	ELECT	47MF	20%	10V
C059	1-101-004-00	CERAMIC	0.01MF		50V
C060	1-108-579-00	MYLAR	0.01MF	5%	50V
C061	1-123-382-00	ELECT	3.3MF	20%	50V
C062	1-123-306-00	ELECT	47MF	20%	10V
C063	1-101-004-00	CERAMIC	0.01MF		50V
C064	1-102-521-00	CERAMIC	43PF	5%	50V
C065	1-102-527-00	CERAMIC	82PF	5%	50V
C066	1-102-518-00	CERAMIC	33PF	5%	50V
C067	1-161-025-00	CERAMIC	0.1MF	10%	25V
C068	1-101-004-00	CERAMIC	0.01MF		50V
C069	1-102-962-00	CERAMIC	30PF	5%	50V
C070	1-101-004-00	CERAMIC	0.01MF		50V
C071	1-123-380-00	ELECT	1MF	20%	50V
C072	1-101-004-00	CERAMIC	0.01MF		50V
C073	1-102-525-00	CERAMIC	68PF	5%	50V
C074	1-102-525-00	CERAMIC	68PF	5%	50V
C075	1-101-004-00	CERAMIC	0.01MF		50V
C076	1-102-951-00	CERAMIC	15PF	5%	50V
C077	1-123-330-00	ELECT	22MF	20%	16V
C078	1-123-330-00	ELECT	22MF	20%	16V
C080	1-101-004-00	CERAMIC	0.01MF		50V
C082	1-161-024-00	CERAMIC	0.082MF	10%	25V
C083	1-102-977-00	CERAMIC	200PF	5%	50V
C084	1-123-369-00	ELECT	4.7MF	20%	25V

Ref.No	Part No.	Description			Remark
C085	1-101-004-00	CERAMIC	0.01MF		50V
C086	1-108-557-00	MYLAR	0.0012MF	5%	50V
C087	1-161-057-00	CERAMIC	0.033MF	10%	25V
C088	1-101-361-00	CERAMIC	150PF	5%	50V
C092	1-101-004-00	CERAMIC	0.01MF		50V
C093	1-101-006-00	CERAMIC	0.047MF		50V
C095	1-102-976-00	CERAMIC	180PF	5%	50V
C096	1-102-824-00	CERAMIC	470PF	5%	50V
C097	1-102-823-00	CERAMIC	430PF	5%	50V
C098	1-102-820-00	CERAMIC	330PF	5%	50V
C099	1-102-851-00	CERAMIC	15PF	5%	50V
C100	1-161-025-00	CERAMIC	0.1MF	10%	25V
C101	1-108-595-00	MYLAR	0.047MF	5%	50V
C102	1-161-043-00	CERAMIC	0.0022MF	10%	25V
C103	1-106-172-00	MYLAR	0.001MF	5%	50V
C104	1-102-977-00	CERAMIC	200PF	5%	50V
C105	1-102-973-00	CERAMIC	100PF	5%	50V
C106	1-123-356-00	ELECT	10MF	20%	16V
C107	1-161-025-00	CERAMIC	0.1MF	10%	25V
C108	1-101-004-00	CERAMIC	0.01MF		50V
C109	1-101-004-00	CERAMIC	0.01MF		50V
C111	1-101-882-00	CERAMIC	51PF	5%	50V
C112	1-101-004-00	CERAMIC	0.01MF		50V
C113	1-101-006-00	CERAMIC	0.047MF		50V
C114	1-101-880-00	CERAMIC	47PF	5%	50V
C116	1-101-004-00	CERAMIC	0.01MF		50V
C117	1-101-361-00	CERAMIC	150PF	5%	50V
C118	1-101-004-00	CERAMIC	0.01MF		50V
C119	1-123-306-00	ELECT	47MF	20%	10V
C120	1-101-004-00	CERAMIC	0.01MF		50V
C121	1-101-004-00	CERAMIC	0.01MF		50V
C122	1-101-004-00	CERAMIC	0.01MF		50V
C123	1-101-004-00	CERAMIC	0.01MF		50V
C124	1-102-518-00	CERAMIC	33PF	5%	50V
C125	1-123-330-00	ELECT	22MF	20%	16V
C127	1-123-318-00	ELECT	33MF	20%	16V
C128	1-123-330-00	ELECT	22MF	20%	16V
C129	1-123-330-00	ELECT	22MF	20%	16V
C130	1-123-356-00	ELECT	10MF	20%	16V
C131	1-123-380-00	ELECT	1MF	20%	50V
C132	1-123-369-00	ELECT	4.7MF	20%	25V
C133	1-102-851-00	CERAMIC	15PF	5%	50V
C134	1-102-821-00	CERAMIC	360PF	5%	50V
C135	1-102-823-00	CERAMIC	430PF	5%	50V
C136	1-102-976-00	CERAMIC	180PF	5%	50V
C137	1-102-513-00	CERAMIC	18PF	5%	50V
C138	1-102-529-00	CERAMIC	100PF	5%	50V
C139	1-102-530-00	CERAMIC	120PF	5%	50V
C140	1-102-519-00	CERAMIC	36PF	5%	50V
C141	1-102-529-00	CERAMIC	100PF	5%	50V
C142	1-123-369-00	ELECT	4.7MF	20%	25V
C144	1-102-511-00	CERAMIC	13PF	5%	50V
C145	1-102-522-00	CERAMIC	51PF	5%	50V

When indicating parts by reference number, please include the board name.

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Ref.No	Part No.	Description			Remark
C146	1-102-522-00	CERAMIC	51PF	5%	50V
C147	1-102-511-00	CERAMIC	13PF	5%	50V
C148	1-101-006-00	CERAMIC	0.047MF		50V
C155	1-101-004-00	CERAMIC	0.01MF		50V
C156	1-101-004-00	CERAMIC	0.01MF		50V
C157	1-102-981-00	CERAMIC	300PF	5%	50V
C158	1-102-948-00	CERAMIC	11PF	5%	50V
C159	1-102-822-00	CERAMIC	390PF	5%	50V
C178	1-123-330-00	ELECT	22MF	20%	16V
C179	1-123-356-00	ELECT	10MF	20%	16V
C180	1-123-332-00	ELECT	47MF	20%	16V
C181	1-106-186-00	MYLAR	0.0039MF	5%	50V
C182	1-123-380-00	ELECT	1MF	20%	50V
C183	1-101-006-00	CERAMIC	0.047MF		50V
C184	1-123-332-00	ELECT	47MF	20%	16V
C185	1-123-333-00	ELECT	100MF	20%	16V
C186	1-101-004-00	CERAMIC	0.01MF		50V
C187	1-123-330-00	ELECT	22MF	20%	16V
C188	1-161-025-00	CERAMIC	0.1MF	10%	25V
C189	1-123-356-00	ELECT	10MF	20%	16V
C190	1-123-311-00	ELECT	1000MF	20%	10V
C191	1-101-004-00	CERAMIC	0.01MF		50V
C192	1-123-369-00	ELECT	4.7MF	20%	25V
C196	1-123-380-00	ELECT	1MF	20%	50V
C197	1-123-356-00	ELECT	10MF	20%	16V
C198	1-102-973-00	CERAMIC	100PF	5%	50V
C200	1-101-004-00	CERAMIC	0.01MF		50V
C201	1-123-356-00	ELECT	10MF	20%	16V
C203	1-101-004-00	CERAMIC	0.01MF		50V
C204	1-123-369-00	ELECT	4.7MF	20%	25V
C206	1-101-004-00	CERAMIC	0.01MF		50V
C207	1-161-025-00	CERAMIC	0.1MF	10%	25V
C208	1-123-356-00	ELECT	10MF	20%	16V
C211	1-123-356-00	ELECT	10MF	20%	16V
C212	1-123-333-00	ELECT	100MF	20%	16V
C217	1-161-025-00	CERAMIC	0.1MF	10%	25V
C219	1-123-356-00	ELECT	10MF	20%	16V
C220	1-161-059-00	CERAMIC	0.047MF	10%	25V
C241	1-161-025-00	CERAMIC	0.1MF	10%	25V
C243	1-161-025-00	CERAMIC	0.1MF	10%	25V
C246	1-161-025-00	CERAMIC	0.1MF	10%	25V
C248	1-161-059-00	CERAMIC	0.047MF	10%	25V
C251	1-161-059-00	CERAMIC	0.047MF	10%	25V
C252	1-101-081-00	CERAMIC	130PF	5%	50V
C257	1-161-059-00	CERAMIC	0.047MF	10%	25V
C258	1-161-059-00	CERAMIC	0.047MF	10%	25V
C401	1-123-381-00	ELECT	2.2MF	20%	50V
C402	1-101-001-00	CERAMIC	0.001MF		50V
C403	1-101-001-00	CERAMIC	0.001MF		50V
C404	1-101-004-00	CERAMIC	0.01MF		50V
C405	1-123-330-00	ELECT	22MF	20%	16V
C406	1-123-330-00	ELECT	22MF	20%	16V
C407	1-102-962-00	CERAMIC	30PF	5%	50V
C408	1-101-888-00	CERAMIC	68PF	5%	50V
C409	1-123-381-00	ELECT	2.2MF	20%	50V
C410	1-102-936-00	CERAMIC	3PF	0.25PF	50V
C411	1-101-005-00	CERAMIC	0.022MF		50V
C412	1-123-318-00	ELECT	33MF	20%	16V
C414	1-123-318-00	ELECT	33MF	20%	16V
C415	1-123-356-00	ELECT	10MF	20%	16V
C416	1-102-948-00	CERAMIC	11PF	5%	50V
C417	1-102-948-00	CERAMIC	11PF	5%	50V
C418	1-102-965-00	CERAMIC	39PF	5%	50V
C420	1-123-369-00	ELECT	4.7MF	20%	25V
C421	1-101-006-00	CERAMIC	0.047MF		50V
C501	1-101-004-00	CERAMIC	0.01MF		50V
C502	1-101-004-00	CERAMIC	0.01MF		50V
C503	1-101-004-00	CERAMIC	0.01MF		50V
C504	1-101-005-00	CERAMIC	0.022MF		50V
C505	1-102-822-00	CERAMIC	390PF	5%	50V
C506	1-101-006-00	CERAMIC	0.047MF		50V
C507	1-123-318-00	ELECT	33MF	20%	16V
C607	1-101-004-00	CERAMIC	0.01MF		50V
C608	1-161-059-00	CERAMIC	0.047MF	10%	25V
C609	1-101-006-00	CERAMIC	0.047MF		50V
C611	1-101-006-00	CERAMIC	0.047MF		50V
C613	1-101-004-00	CERAMIC	0.01MF		50V
C616	1-101-518-00	CERAMIC	33PF	5%	50V
C617	1-161-025-00	CERAMIC	0.1MF	10%	25V
C618	1-161-025-00	CERAMIC	0.1MF	10%	25V
C619	1-161-025-00	CERAMIC	0.1MF	10%	25V
C620	1-102-516-00	CERAMIC	27PF	5%	50V

FILTER

CF001	1-527-998-00	FILTER, CERAMIC
CF002	1-527-875-00	FILTER, CERAMIC
CF003	1-527-849-00	FILTER, CERAMIC

CONNECTOR

CN001	*1-560-894-00	PIN, CONNECTOR 6P
CN002	*1-560-896-00	PIN, CONNECTOR 8P
CN003	*1-560-891-00	PIN, CONNECTOR 3P
CN004	*1-560-894-00	PIN, CONNECTOR 6P
CN005	*1-560-893-00	PIN, CONNECTOR 5P
CN006	*1-560-893-00	PIN, CONNECTOR 5P
CN007	*1-560-892-00	PIN, CONNECTOR 4P
CN008	*1-560-895-00	PIN, CONNECTOR 7P

TRIMMER

CV001	1-141-275-00	CAP, TRIMMER

DIODE

D005	8-719-911-19	DIODE 1SS119
D006	8-719-000-06	DIODE MC921
D009	8-719-000-06	DIODE MC921
D011	8-719-911-19	DIODE 1SS119

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description	Remark
D012	8-719-911-19	DIODE 1SS119	
D013	8-719-911-19	DIODE 1SS119	
D014	8-719-911-19	DIODE 1SS119	
D015	8-719-911-19	DIODE 1SS119	
D016	8-719-000-12	DIODE MC931	
D017	8-719-911-19	DIODE 1SS119	
D018	8-719-911-19	DIODE 1SS119	
D019	8-719-911-19	DIODE 1SS119	
D020	8-719-911-19	DIODE 1SS119	
D021	8-719-911-19	DIODE 1SS119	
D022	8-719-911-19	DIODE 1SS119	
D023	8-719-911-19	DIODE 1SS119	
D027	8-719-000-06	DIODE MC921	
D029	8-719-100-57	DIODE RD10E-B2	
D030	8-719-911-19	DIODE 1SS119	
D031	8-719-911-19	DIODE 1SS119	
D036	8-719-911-19	DIODE 1SS119	
D607	8-719-000-06	DIODE MC921	
D702	8-719-911-19	DIODE 1SS119	

DELAY LINE

Ref.No	Part No.	Description	Remark
DL001	1-415-313-00	DELAY LINE (1H)	
DL401	1-415-352-11	DELAY LINE, 1H	
DL501	1-415-282-00	DELAY LINE	

IC

Ref.No	Part No.	Description	Remark
IC001	8-759-909-20	IC BA634	
IC002	8-759-904-95	IC BA7007	
IC003	8-759-202-47	IC CX10023	
IC004	8-759-208-94	IC CX894	
IC005	8-752-006-10	IC CX20061	
IC006	8-759-203-99	IC CX10021B-NP	
IC009	8-759-101-62	IC CX20043	
IC011	8-752-006-10	IC CX20061	
IC012	8-759-979-26	IC CX7926	
IC401	8-758-662-00	IC CX866B	

COIL

Ref.No	Part No.	Description	Remark
L001	1-407-499-00	MICRO INDUCTOR 3.9MMH	
L002	1-407-496-00	MICRO INDUCTOR 2.2MMH	
L003	1-408-408-00	MICRO INDUCTOR 8.2UH	
L004	1-408-406-00	MICRO INDUCTOR 5.6UH	
L005	1-408-415-00	MICRO INDUCTOR 33UH	
L006	1-408-428-00	MICRO INDUCTOR 390UH	
L007	1-408-427-00	MICRO INDUCTOR 330UH	
L008	1-408-421-00	MICRO INDUCTOR 100UH	
L010	1-408-427-00	MICRO INDUCTOR 330UH	
L011	1-408-423-00	MICRO INDUCTOR 150UH	
L012	1-408-409-00	MICRO INDUCTOR 10UH	
L014	1-408-416-00	MICRO INDUCTOR 39UH	
L015	1-408-419-00	MICRO INDUCTOR 68UH	
L016	1-408-413-00	MICRO INDUCTOR 22UH	
L017	1-408-423-00	MICRO INDUCTOR 150UH	
L018	1-408-419-00	MICRO INDUCTOR 68UH	
L019	1-408-416-00	MICRO INDUCTOR 39UH	
L020	1-408-416-00	MICRO INDUCTOR 39UH	
L021	1-408-422-00	MICRO INDUCTOR 120UH	
L022	1-408-424-00	MICRO INDUCTOR 180UH	
L023	1-408-422-00	MICRO INDUCTOR 120UH	
L026	1-408-416-00	MICRO INDUCTOR 39UH	
L036	1-408-429-00	MICRO INDUCTOR 470UH	
L041	1-408-424-00	MICRO INDUCTOR 180UH	
L401	1-408-397-00	MICRO INDUCTOR 1UH	
L402	1-408-397-00	MICRO INDUCTOR 1UH	
L501	1-408-408-00	MICRO INDUCTOR 8.2UH	
L502	1-408-423-00	MICRO INDUCTOR 150UH	
L601	1-408-416-00	MICRO INDUCTOR 39UH	
L602	1-408-416-00	MICRO INDUCTOR 39UH	

LOW PASS FILTER

Ref.No	Part No.	Description	Remark
LPF001	1-235-097-00	FILTER, LOW PASS	

VARIABLE COIL

Ref.No	Part No.	Description	Remark
LV001	1-407-291-00	MICRO INDUCTOR 15MMH	
LV002	1-407-573-00	COIL, VARIABLE 47UH	
LV003	1-407-571-00	COIL, VARIABLE 22UH	
LV501	1-407-569-00	COIL, VARIABLE 10UH	

IC LINK

Ref.No	Part No.	Description	Remark
PS001⚠	1-532-685-00	LINK, IC 0.8A	

TRANSISTOR

Ref.No	Part No.	Description	Remark
Q010	8-729-177-43	TRANSISTOR 2SD774	
Q011	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q015	8-729-245-83	TRANSISTOR 2SC2458	
Q016	8-729-245-83	TRANSISTOR 2SC2458	
Q019	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q020	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q021	8-729-245-83	TRANSISTOR 2SC2458	
Q022	8-729-245-83	TRANSISTOR 2SC2458	
Q023	8-729-245-83	TRANSISTOR 2SC2458	
Q024	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q025	8-729-245-83	TRANSISTOR 2SC2458	
Q026	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q027	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q028	8-729-245-83	TRANSISTOR 2SC2458	
Q029	8-729-245-83	TRANSISTOR 2SC2458	
Q030	8-729-245-83	TRANSISTOR 2SC2458	
Q031	8-729-900-36	TRANSISTOR DTC124ES	
Q032	8-729-245-83	TRANSISTOR 2SC2458	
Q033	8-729-245-83	TRANSISTOR 2SC2458	
Q034	8-729-245-83	TRANSISTOR 2SC2458	
Q035	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q036	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q037	8-729-384-46	TRANSISTOR 2SA844-C	
Q038	8-729-384-46	TRANSISTOR 2SA844-C	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

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Ref.No	Part No.	Description	Remark
Q039	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q040	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q041	8-729-384-46	TRANSISTOR 2SA844-C	
Q042	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q043	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q044	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q045	8-729-384-46	TRANSISTOR 2SA844-C	
Q047	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q048	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q049	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q050	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q051	8-729-384-46	TRANSISTOR 2SA844-C	
Q052	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q053	8-729-384-46	TRANSISTOR 2SA844-C	
Q054	8-729-384-46	TRANSISTOR 2SA844-C	
Q055	8-729-384-46	TRANSISTOR 2SA844-C	
Q056	8-729-603-30	TRANSISTOR 2SC403SP-3	
Q060	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q061	8-729-245-83	TRANSISTOR 2SC2458	
Q062	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q063	8-729-245-83	TRANSISTOR 2SC2458	
Q064	8-729-245-83	TRANSISTOR 2SC2458	
Q065	8-729-245-83	TRANSISTOR 2SC2458	
Q067	8-729-245-83	TRANSISTOR 2SC2458	
Q068	8-729-245-83	TRANSISTOR 2SC2458	
Q069	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q071	8-729-245-83	TRANSISTOR 2SC2458	
Q075	8-729-900-85	TRANSISTOR DTC144WS	
Q076	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q077	8-729-245-83	TRANSISTOR 2SC2458	
Q100	8-729-900-85	TRANSISTOR DTC144WS	
Q101	8-729-900-89	TRANSISTOR DTC144ES	
Q102	8-729-900-65	TRANSISTOR DTA144ES	
Q103	8-729-245-83	TRANSISTOR 2SC2458	
Q401	8-729-245-83	TRANSISTOR 2SC2458	
Q501	8-729-245-83	TRANSISTOR 2SC2458	
Q502	8-729-245-83	TRANSISTOR 2SC2458	
Q503	8-729-245-83	TRANSISTOR 2SC2458	
Q504	8-729-245-83	TRANSISTOR 2SC2458	
Q601	8-729-900-36	TRANSISTOR DTC124ES	
Q602	8-729-900-36	TRANSISTOR DTC124ES	
Q603	8-729-900-36	TRANSISTOR DTC124ES	
Q604	8-729-900-36	TRANSISTOR DTC124ES	
Q615	8-729-900-36	TRANSISTOR DTC124ES	
Q616	8-729-900-36	TRANSISTOR DTC124ES	
Q617	8-729-205-02	TRANSISTOR 2SA1150	
Q620	8-729-204-83	TRANSISTOR 2SA1048-GR	
		RESISTOR	
R026	1-247-871-00	CARBON 47K 5% 1/6W	
R028	1-247-855-00	CARBON 10K 5% 1/6W	
R029	1-247-855-00	CARBON 10K 5% 1/6W	
R030	1-247-867-00	CARBON 33K 5% 1/6W	
R032	1-247-815-00	CARBON 220 5% 1/6W	
R035	1-247-859-00	CARBON 15K 5% 1/6W	
R037	1-247-869-00	CARBON 39K 5% 1/6W	
R038	1-247-837-00	CARBON 1.8K 5% 1/6W	
R041	1-247-838-00	CARBON 2K 5% 1/6W	
R046	1-247-835-00	CARBON 1.5K 5% 1/6W	
R047	1-247-879-00	CARBON 100K 5% 1/6W	
R048	1-247-831-00	CARBON 1K 5% 1/6W	
R049	1-247-863-00	CARBON 22K 5% 1/6W	
R050	1-247-853-00	CARBON 8.2K 5% 1/6W	
R051	1-247-821-00	CARBON 390 5% 1/6W	
R052	1-247-819-00	CARBON 330 5% 1/6W	
R053	1-247-843-00	CARBON 3.3K 5% 1/6W	
R054	1-247-847-00	CARBON 4.7K 5% 1/6W	
R055	1-247-849-00	CARBON 5.6K 5% 1/6W	
R056	1-247-867-00	CARBON 33K 5% 1/6W	
R058	1-247-855-00	CARBON 10K 5% 1/6W	
R059	1-247-859-00	CARBON 15K 5% 1/6W	
R060	1-247-867-00	CARBON 33K 5% 1/6W	
R061	1-247-855-00	CARBON 10K 5% 1/6W	
R062	1-247-855-00	CARBON 10K 5% 1/6W	
R063	1-247-841-00	CARBON 2.7K 5% 1/6W	
R064	1-247-848-00	CARBON 5.1K 5% 1/6W	
R065	1-247-889-00	CARBON 270K 5% 1/6W	
R066	1-247-870-00	CARBON 43K 5% 1/6W	
R067	1-247-862-00	CARBON 20K 5% 1/6W	
R068	1-247-838-00	CARBON 2K 5% 1/6W	
R069	1-247-831-00	CARBON 1K 5% 1/6W	
R070	1-247-831-00	CARBON 1K 5% 1/6W	
R071	1-247-855-00	CARBON 10K 5% 1/6W	
R072	1-247-841-00	CARBON 2.7K 5% 1/6W	
R073	1-247-831-00	CARBON 1K 5% 1/6W	
R074	1-247-831-00	CARBON 1K 5% 1/6W	
R075	1-247-815-00	CARBON 220 5% 1/6W	
R076	1-247-855-00	CARBON 10K 5% 1/6W	
R077	1-247-855-00	CARBON 10K 5% 1/6W	
R078	1-247-867-00	CARBON 33K 5% 1/6W	
R079	1-247-855-00	CARBON 10K 5% 1/6W	
R080	1-247-853-00	CARBON 8.2K 5% 1/6W	
R081	1-247-843-00	CARBON 3.3K 5% 1/6W	
R082	1-247-871-00	CARBON 47K 5% 1/6W	
R083	1-247-825-00	CARBON 560 5% 1/6W	
R084	1-247-831-00	CARBON 1K 5% 1/6W	
R085	1-247-803-00	CARBON 68 5% 1/6W	
R086	1-247-825-00	CARBON 560 5% 1/6W	
R087	1-247-825-00	CARBON 560 5% 1/6W	
R088	1-247-807-00	CARBON 100 5% 1/6W	
R091	1-247-824-00	CARBON 510 5% 1/6W	
R092	1-247-791-00	CARBON 22 5% 1/6W	
R093	1-247-806-00	CARBON 91 5% 1/6W	
R094	1-247-869-00	CARBON 39K 5% 1/6W	
R095	1-247-872-00	CARBON 51K 5% 1/6W	
R096	1-247-879-00	CARBON 100K 5% 1/6W	

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description				Remark
R097	1-247-882-00	CARBON	130K	5%	1/6W	
R098	1-247-890-00	CARBON	300K	5%	1/6W	
R100	1-247-869-00	CARBON	39K	5%	1/6W	
R101	1-247-864-00	CARBON	24K	5%	1/6W	
R103	1-247-831-00	CARBON	1K	5%	1/6W	
R104	1-247-839-00	CARBON	2.2K	5%	1/6W	
R105	1-247-829-00	CARBON	820	5%	1/6W	
R106	1-247-831-00	CARBON	1K	5%	1/6W	
R107	1-247-824-00	CARBON	510	5%	1/6W	
R108	1-247-839-00	CARBON	2.2K	5%	1/6W	
R109	1-247-867-00	CARBON	33K	5%	1/6W	
R111	1-247-846-00	CARBON	4.3K	5%	1/6W	
R112	1-247-854-00	CARBON	9.1K	5%	1/6W	
R113	1-247-843-00	CARBON	3.3K	5%	1/6W	
R114	1-247-828-00	CARBON	750	5%	1/6W	
R115	1-247-879-00	CARBON	100K	5%	1/6W	
R116	1-247-853-00	CARBON	8.2K	5%	1/6W	
R117	1-247-846-00	CARBON	4.3K	5%	1/6W	
R120	1-247-831-00	CARBON	1K	5%	1/6W	
R121	1-247-831-00	CARBON	1K	5%	1/6W	
R122	1-247-839-00	CARBON	2.2K	5%	1/6W	
R123	1-247-841-00	CARBON	2.7K	5%	1/6W	
R124	1-247-819-00	CARBON	330	5%	1/6W	
R125	1-247-831-00	CARBON	1K	5%	1/6W	
R126	1-247-831-00	CARBON	1K	5%	1/6W	
R127	1-247-835-00	CARBON	1.5K	5%	1/6W	
R128	1-247-831-00	CARBON	1K	5%	1/6W	
R129	1-247-867-00	CARBON	33K	5%	1/6W	
R130	1-247-842-00	CARBON	3K	5%	1/6W	
R131	1-247-841-00	CARBON	2.7K	5%	1/6W	
R132	1-247-887-00	CARBON	220K	5%	1/6W	
R134	1-247-847-00	CARBON	4.7K	5%	1/6W	
R135	1-247-883-00	CARBON	150K	5%	1/6W	
R136	1-247-879-00	CARBON	100K	5%	1/6W	
R137	1-247-857-00	CARBON	12K	5%	1/6W	
R138	1-247-861-00	CARBON	18K	5%	1/6W	
R139	1-247-841-00	CARBON	2.7K	5%	1/6W	
R140	1-247-867-00	CARBON	33K	5%	1/6W	
R141	1-247-831-00	CARBON	1K	5%	1/6W	
R142	1-247-842-00	CARBON	3K	5%	1/6W	
R143	1-247-847-00	CARBON	4.7K	5%	1/6W	
R144	1-247-824-00	CARBON	510	5%	1/6W	
R145	1-247-838-00	CARBON	2K	5%	1/6W	
R146	1-247-829-00	CARBON	820	5%	1/6W	
R147	1-247-855-00	CARBON	10K	5%	1/6W	
R148	1-247-831-00	CARBON	1K	5%	1/6W	
R149	1-247-819-00	CARBON	330	5%	1/6W	
R150	1-247-863-00	CARBON	22K	5%	1/6W	
R151	1-247-812-00	CARBON	160	5%	1/6W	
R152	1-247-829-00	CARBON	820	5%	1/6W	
R153	1-247-863-00	CARBON	22K	5%	1/6W	
R154	1-247-821-00	CARBON	390	5%	1/6W	
R155	1-247-839-00	CARBON	2.2K	5%	1/6W	
R156	1-247-839-00	CARBON	2.2K	5%	1/6W	
R157	1-247-837-00	CARBON	1.8K	5%	1/6W	
R158	1-247-817-00	CARBON	270	5%	1/6W	
R159	1-247-810-00	CARBON	130	5%	1/6W	
R160	1-247-832-00	CARBON	1.1K	5%	1/6W	
R161	1-247-855-00	CARBON	10K	5%	1/6W	
R162	1-247-835-00	CARBON	1.5K	5%	1/6W	
R163	1-247-842-00	CARBON	3K	5%	1/6W	
R164	1-247-830-00	CARBON	910	5%	1/6W	
R165	1-247-834-00	CARBON	1.3K	5%	1/6W	
R166	1-247-818-00	CARBON	300	5%	1/6W	
R167	1-247-849-00	CARBON	5.6K	5%	1/6W	
R168	1-247-836-00	CARBON	1.6K	5%	1/6W	
R169	1-247-840-00	CARBON	2.4K	5%	1/6W	
R170	1-247-804-00	CARBON	75	5%	1/6W	
R171	1-247-901-00	CARBON	820K	5%	1/6W	
R172	1-247-857-00	CARBON	12K	5%	1/6W	
R173	1-247-861-00	CARBON	18K	5%	1/6W	
R174	1-247-839-00	CARBON	2.2K	5%	1/6W	
R175	1-247-831-00	CARBON	1K	5%	1/6W	
R176	1-247-839-00	CARBON	2.2K	5%	1/6W	
R178	1-247-839-00	CARBON	2.2K	5%	1/6W	
R179	1-247-843-00	CARBON	3.3K	5%	1/6W	
R180	1-247-835-00	CARBON	1.5K	5%	1/6W	
R181	1-247-835-00	CARBON	1.5K	5%	1/6W	
R185	1-247-843-00	CARBON	3.3K	5%	1/6W	
R186	1-247-830-00	CARBON	910	5%	1/6W	
R187	1-247-831-00	CARBON	1K	5%	1/6W	
R188	1-247-839-00	CARBON	2.2K	5%	1/6W	
R189	1-247-834-00	CARBON	1.3K	5%	1/6W	
R190	1-247-834-00	CARBON	1.3K	5%	1/6W	
R191	1-247-831-00	CARBON	1K	5%	1/6W	
R192	1-247-831-00	CARBON	1K	5%	1/6W	
R193	1-247-855-00	CARBON	10K	5%	1/6W	
R194	1-247-819-00	CARBON	330	5%	1/6W	
R195	1-247-812-00	CARBON	160	5%	1/6W	
R196	1-247-863-00	CARBON	22K	5%	1/6W	
R197	1-247-863-00	CARBON	22K	5%	1/6W	
R198	1-247-829-00	CARBON	820	5%	1/6W	
R199	1-247-821-00	CARBON	390	5%	1/6W	
R200	1-247-839-00	CARBON	2.2K	5%	1/6W	
R201	1-247-837-00	CARBON	1.8K	5%	1/6W	
R202	1-247-831-00	CARBON	1K	5%	1/6W	
R203	1-247-815-00	CARBON	220	5%	1/6W	
R204	1-247-811-00	CARBON	150	5%	1/6W	
R205	1-247-811-00	CARBON	150	5%	1/6W	
R206	1-247-834-00	CARBON	1.3K	5%	1/6W	
R207	1-247-874-00	CARBON	62K	5%	1/6W	
R208	1-247-874-00	CARBON	62K	5%	1/6W	
R209	1-247-833-00	CARBON	1.2K	5%	1/6W	
R210	1-247-824-00	CARBON	510	5%	1/6W	
R211	1-247-831-00	CARBON	1K	5%	1/6W	
R212	1-247-824-00	CARBON	510	5%	1/6W	

When indicating parts by reference number, please include the board name.

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Ref.No	Part No.	Description				Remark
R213	1-247-829-00	CARBON	820	5%	1/6W	
R214	1-247-831-00	CARBON	1K	5%	1/6W	
R215	1-247-831-00	CARBON	1K	5%	1/6W	
R216	1-247-832-00	CARBON	1.1K	5%	1/6W	
R217	1-247-831-00	CARBON	1K	5%	1/6W	
R218	1-247-831-00	CARBON	1K	5%	1/6W	
R219	1-247-866-00	CARBON	30K	5%	1/6W	
R220	1-247-874-00	CARBON	62K	5%	1/6W	
R221	1-247-849-00	CARBON	5.6K	5%	1/6W	
R222	1-247-837-00	CARBON	1.8K	5%	1/6W	
R223	1-247-837-00	CARBON	1.8K	5%	1/6W	
R231	1-247-867-00	CARBON	33K	5%	1/6W	
R235	1-247-831-00	CARBON	1K	5%	1/6W	
R236	1-247-853-00	CARBON	8.2K	5%	1/6W	
R239	1-247-855-00	CARBON	10K	5%	1/6W	
R241	1-247-804-00	CARBON	75	5%	1/6W	
R242	1-247-879-00	CARBON	100K	5%	1/6W	
R243	1-247-855-00	CARBON	10K	5%	1/6W	
R244	1-247-851-00	CARBON	6.8K	5%	1/6W	
R245	1-247-879-00	CARBON	100K	5%	1/6W	
R246	1-247-871-00	CARBON	47K	5%	1/6W	
R247	1-247-871-00	CARBON	47K	5%	1/6W	
R248	1-247-818-00	CARBON	300	5%	1/6W	
R249	1-247-813-00	CARBON	180	5%	1/6W	
R250	1-247-811-00	CARBON	150	5%	1/6W	
R251	1-247-838-00	CARBON	2K	5%	1/6W	
R252	1-247-803-00	CARBON	68	5%	1/6W	
R254	1-247-855-00	CARBON	10K	5%	1/6W	
R255	1-247-858-00	CARBON	13K	5%	1/6W	
R256	1-247-843-00	CARBON	3.3K	5%	1/6W	
R257	1-247-835-00	CARBON	1.5K	5%	1/6W	
R258	1-247-852-00	CARBON	7.5K	5%	1/6W	
R259	1-247-831-00	CARBON	1K	5%	1/6W	
R260	1-247-841-00	CARBON	2.7K	5%	1/6W	
R261	1-247-863-00	CARBON	22K	5%	1/6W	
R262	1-247-849-00	CARBON	5.6K	5%	1/6W	
R274	1-247-883-00	CARBON	150K	5%	1/6W	
R275	1-247-871-00	CARBON	47K	5%	1/6W	
R276	1-247-849-00	CARBON	5.6K	5%	1/6W	
R277	1-247-855-00	CARBON	10K	5%	1/6W	
R280	1-247-821-00	CARBON	390	5%	1/6W	
R281	1-247-883-00	CARBON	150K	5%	1/6W	
R282	1-247-819-00	CARBON	330	5%	1/6W	
R283	1-247-831-00	CARBON	1K	5%	1/6W	
R284	1-247-877-00	CARBON	82K	5%	1/6W	
R286	1-247-848-00	CARBON	5.1K	5%	1/6W	
R287	1-247-831-00	CARBON	1K	5%	1/6W	
R291	1-247-863-00	CARBON	22K	5%	1/6W	
R292	1-247-875-00	CARBON	68K	5%	1/6W	
R293	1-247-819-00	CARBON	330	5%	1/6W	
R295	1-247-839-00	CARBON	2.2K	5%	1/6W	
R296	1-247-811-00	CARBON	150	5%	1/6W	
R298	1-247-894-00	CARBON	430K	5%	1/6W	
R299	1-247-892-00	CARBON	360K	5%	1/6W	
R301	1-247-855-00	CARBON	10K	5%	1/6W	
R302	1-247-819-00	CARBON	330	5%	1/6W	
R303	1-247-819-00	CARBON	330	5%	1/6W	
R304	1-247-847-00	CARBON	4.7K	5%	1/6W	
R305	1-247-835-00	CARBON	1.5K	5%	1/6W	
R312	1-247-847-00	CARBON	4.7K	5%	1/6W	
R313	1-247-823-00	CARBON	470	5%	1/6W	
R317	1-247-855-00	CARBON	10K	5%	1/6W	
R318	1-247-865-00	CARBON	27K	5%	1/6W	
R320	1-247-878-00	CARBON	91K	5%	1/6W	
R321	1-247-887-00	CARBON	220K	5%	1/6W	
R325	1-247-807-00	CARBON	100	5%	1/6W	
R331	1-247-852-00	CARBON	7.5K	5%	1/6W	
R342	1-247-807-00	CARBON	100	5%	1/6W	
R346	1-247-847-00	CARBON	4.7K	5%	1/6W	
R351	1-247-815-00	CARBON	220	5%	1/6W	
R352	1-247-855-00	CARBON	10K	5%	1/6W	
R353	1-247-831-00	CARBON	1K	5%	1/6W	
R357	1-247-829-00	CARBON	820	5%	1/6W	
R358	1-247-855-00	CARBON	10K	5%	1/6W	
R359	1-247-839-00	CARBON	2.2K	5%	1/6W	
R370	1-247-790-00	CARBON	20	5%	1/6W	
R401	1-247-810-00	CARBON	130	5%	1/6W	
R402	1-247-808-00	CARBON	110	5%	1/6W	
R403	1-247-867-00	CARBON	33K	5%	1/6W	
R404	1-247-871-00	CARBON	47K	5%	1/6W	
R405	1-247-831-00	CARBON	1K	5%	1/6W	
R406	1-247-832-00	CARBON	1.1K	5%	1/6W	
R407	1-247-832-00	CARBON	1.1K	5%	1/6W	
R408	1-247-849-00	CARBON	5.6K	5%	1/6W	
R409	1-247-831-00	CARBON	1K	5%	1/6W	
R410	1-247-831-00	CARBON	1K	5%	1/6W	
R411	1-247-847-00	CARBON	4.7K	5%	1/6W	
R412	1-247-828-00	CARBON	750	5%	1/6W	
R413	1-247-812-00	CARBON	160	5%	1/6W	
R414	1-247-847-00	CARBON	4.7K	5%	1/6W	
R415	1-247-831-00	CARBON	1K	5%	1/6W	
R416	1-247-846-00	CARBON	4.3K	5%	1/6W	
R510	1-247-824-00	CARBON	510	5%	1/6W	
R511	1-247-867-00	CARBON	33K	5%	1/6W	
R512	1-247-847-00	CARBON	4.7K	5%	1/6W	
R513	1-247-863-00	CARBON	22K	5%	1/6W	
R514	1-247-821-00	CARBON	390	5%	1/6W	
R515	1-247-839-00	CARBON	2.2K	5%	1/6W	
R516	1-247-821-00	CARBON	390	5%	1/6W	
R517	1-247-821-00	CARBON	390	5%	1/6W	
R518	1-247-821-00	CARBON	390	5%	1/6W	
R519	1-247-821-00	CARBON	390	5%	1/6W	
R520	1-247-839-00	CARBON	2.2K	5%	1/6W	
R521	1-247-821-00	CARBON	390	5%	1/6W	
R522	1-247-839-00	CARBON	2.2K	5%	1/6W	
R525	1-247-843-00	CARBON	3.3K	5%	1/6W	

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description				Remark
R601	1-247-847-00	CARBON	4.7K	5%	1/6W	
R602	1-247-855-00	CARBON	10K	5%	1/6W	
R603	1-247-843-00	CARBON	3.3K	5%	1/6W	
R631	1-247-855-00	CARBON	10K	5%	1/6W	
R632	1-247-855-00	CARBON	10K	5%	1/6W	
R633	1-247-831-00	CARBON	1K	5%	1/6W	
R635	1-247-883-00	CARBON	150K	5%	1/6W	
R638	1-247-807-00	CARBON	100	5%	1/6W	
R639	1-247-831-00	CARBON	1K	5%	1/6W	
R640	1-247-815-00	CARBON	220	5%	1/6W	
R641	1-247-831-00	CARBON	1K	5%	1/6W	
R643	1-247-883-00	CARBON	150K	5%	1/6W	
R644	1-247-818-00	CARBON	300	5%	1/6W	
R646	1-247-859-00	CARBON	15K	5%	1/6W	

VARIABLE RESISTOR

Ref.No	Part No.	Description
RV001	1-228-989-00	RES, ADJ, METAL GLAZE 470
RV002	1-228-748-00	RES, ADJ, CARBON 10K
RV003	1-228-750-00	RES, ADJ, CARBON 47K
RV005	1-228-750-00	RES, ADJ, CARBON 47K
RV006	1-228-749-00	RES, ADJ, CARBON 22K
RV007	1-228-748-00	RES, ADJ, CARBON 10K
RV008	1-228-745-00	RES, ADJ, CARBON 1K
RV009	1-228-996-00	RES, ADJ, METAL GLAZE 47K
RV010	1-228-749-00	RES, ADJ, CARBON 22K
RV012	1-228-750-00	RES, ADJ, CARBON 47K
RV013	1-228-750-00	RES, ADJ, CARBON 47K
RV014	1-228-748-00	RES, ADJ, CARBON 10K
RV015	1-228-989-00	RES, ADJ, METAL GLAZE 470
RV016	1-228-745-00	RES, ADJ, CARBON 1K
RV019	1-228-993-00	RES, ADJ, METAL GLAZE 4.7K
RV020	1-228-745-00	RES, ADJ, CARBON 1K
RV021	1-228-750-00	RES, ADJ, CARBON 47K
RV401	1-228-994-00	RES, ADJ, METAL GLAZE 10K
RV501	1-228-989-00	RES, ADJ, METAL GLAZE 470
RV602	1-228-990-00	RES, ADJ, METAL GLAZE 1K

SWITCH

Ref.No	Part No.	Description
S601	1-553-725-21	SWITCH, SLIDE

TRANSFORMER

Ref.No	Part No.	Description
T001	1-426-093-00	COIL, REC C BPT

CRYSTAL

Ref.No	Part No.	Description
X001	1-527-345-00	CRYSTAL, OSC

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Ref.No	Part No.	Description
	*A-6715-226-A	SS-34 BOARD, COMPLETE **********************
	*3-681-170-00	HEAT SINK, S
	*3-846-049-11	PIN, LEAD
	7-621-770-87	SCREW +B 2.6X5

CAPACITOR

Ref.No	Part No.	Description				Remark
C304	1-123-332-00	ELECT	47MF	20%	16V	
C305	1-123-333-00	ELECT	100MF	20%	16V	
C306	1-123-332-00	ELECT	47MF	20%	16V	
C307	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C308	1-123-332-00	ELECT	47MF	20%	16V	
C309	1-123-381-00	ELECT	2.2MF	20%	50V	
C310	1-161-013-00	CERAMIC	0.01MF	10%	25V	
C311	1-127-477-00	ELECT(SOLID)	0.47MF	5%	25V	
C312	1-123-332-00	ELECT	47MF	20%	16V	
C313	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C314	1-131-357-00	TANTALUM	4.7MF	20%	25V	
C315	1-123-381-00	ELECT	2.2MF	20%	50V	
C316	1-131-357-00	TANTALUM	4.7MF	20%	25V	
C317	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C318	1-123-381-00	ELECT	2.2MF	20%	50V	
C319	1-161-013-00	CERAMIC	0.01MF	10%	25V	
C320	1-161-054-00	CERAMIC	0.018MF	10%	25V	
C321	1-123-356-00	ELECT	10MF	20%	16V	
C322	1-123-330-00	ELECT	22MF	20%	16V	
C323	1-124-429-00	ELECT	0.68MF	20%	50V	
C324	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C325	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C326	1-123-330-00	ELECT	22MF	20%	16V	
C327	1-130-483-00	MYLAR	0.01MF	5%	50V	
C328	1-130-483-00	MYLAR	0.01MF	5%	50V	
C329	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C330	1-123-382-00	ELECT	3.3MF	20%	50V	
C331	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C332	1-123-310-00	ELECT	470MF	20%	10V	
C333	1-123-310-00	ELECT	470MF	20%	10V	
C334	1-123-382-00	ELECT	3.3MF	20%	50V	
C335	1-123-382-00	ELECT	3.3MF	20%	50V	
C336	1-161-059-00	CERAMIC	0.047MF	10%	25V	
C337	1-130-482-00	MYLAR	0.0082MF	5%	50V	
C338	1-123-382-00	ELECT	3.3MF	20%	50V	
C339	1-161-054-00	CERAMIC	0.018MF	10%	25V	
C340	1-161-013-00	CERAMIC	0.01MF	10%	25V	
C341	1-161-013-00	CERAMIC	0.01MF	10%	25V	
C342	1-161-054-00	CERAMIC	0.018MF	10%	25V	
C343	1-127-479-51	ELECT(SOLID)	1MF	5%	25V	
C344	1-161-055-00	CERAMIC	0.022MF	10%	25V	
C345	1-161-002-00	CERAMIC	0.0012MF	10%	25V	
C346	1-161-054-00	CERAMIC	0.018MF	10%	25V	
C347	1-161-054-00	CERAMIC	0.018MF	10%	25V	
C351	1-161-057-00	CERAMIC	0.033MF	10%	25V	
C352	1-123-381-00	ELECT	2.2MF	20%	50V	
C353	1-161-057-00	CERAMIC	0.033MF	10%	25V	
C354	1-123-331-00	ELECT	33MF	20%	25V	
C355	1-123-331-00	ELECT	33MF	20%	25V	
C356	1-123-308-00	ELECT	220MF	20%	6.3V	
C357	1-161-059-00	CERAMIC	0.047MF	10%	25V	

When indicating parts by reference number, please include the board name.

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Ref.No	Part No.	Description			Remark
C358	1-123-333-00	ELECT	100MF	20%	16V
C359	1-123-617-00	ELECT	10MF	20%	16V
C361	1-123-821-00	ELECT	47MF	20%	16V
C362	1-123-333-00	ELECT	100MF	20%	16V
C364	1-161-059-00	CERAMIC	0.047MF	10%	25V
C365	1-123-380-00	ELECT	1MF	20%	50V
C366	1-161-013-00	CERAMIC	0.01MF	10%	25V
C367	1-161-059-00	CERAMIC	0.047MF	10%	25V
C368	1-161-043-00	CERAMIC	0.0022MF	10%	50V
C370	1-161-063-00	CERAMIC	0.1MF	20%	25V
C601	1-123-318-00	ELECT	33MF	20%	16V
C602	1-161-047-00	CERAMIC	0.0047MF	10%	25V
C603	1-123-330-00	ELECT	22MF	20%	16V
C604	1-161-055-00	CERAMIC	0.022MF	10%	25V
C605	1-161-059-00	CERAMIC	0.047MF	10%	25V
C606	1-161-059-00	CERAMIC	0.047MF	10%	25V
C607	1-129-794-00	FILM	0.0033MF	5%	100V
C608	1-129-794-00	FILM	0.0033MF	5%	100V
C609	1-127-473-00	ELECT(SOLID)	0.1MF	5%	25V
C610	1-131-409-00	ELECT(SOLID)	0.33MF	5%	25V
C611	1-102-518-00	CERAMIC	33PF	5%	50V
C612	1-102-518-00	CERAMIC	33PF	5%	50V
C613	1-123-318-00	ELECT	33MF	20%	10V
C614	1-161-013-00	CERAMIC	0.01MF	10%	25V
C616	1-123-382-00	ELECT	3.3MF	20%	50V
C650	1-161-773-00	CERAMIC	0.1MF	20%	25V
C651	1-161-047-00	CERAMIC	0.0047MF	10%	25V
C652	1-123-381-00	ELECT	2.2MF	20%	50V
C653	1-102-973-00	CERAMIC	100PF	5%	50V
C654	1-102-973-00	CERAMIC	100PF	5%	50V
C655	1-102-973-00	CERAMIC	100PF	5%	50V
C656	1-102-973-00	CERAMIC	100PF	5%	50V
C657	1-102-973-00	CERAMIC	100PF	5%	50V

FILTER

Ref.No	Part No.	Description	Remark
CF601	1-527-992-11	OSCILLATOR, CERAMIC	

CONNECTOR

Ref.No	Part No.	Description	Remark
CN301	*1-560-892-00	PIN, CONNECTOR 4P	
CN302	*1-560-466-00	PIN, CONNECTOR 3P	
CN303	*1-560-892-00	PIN, CONNECTOR 4P	
CN304	*1-560-892-00	PIN, CONNECTOR 4P	
CN305	*1-560-890-00	PIN, CONNECTOR 2P	
CN306	*1-560-894-00	PIN, CONNECTOR 6P	
CN307	*1-560-890-00	PIN, CONNECTOR 2P	
CN308	*1-560-892-00	PIN, CONNECTOR 4P	
CN309	*1-560-895-00	PIN, CONNECTOR 7P	
CN310	*1-560-891-00	PIN, CONNECTOR 3P	
CN311	*1-560-891-00	PIN, CONNECTOR 3P	
CN601	*1-560-891-00	PIN, CONNECTOR 3P	
CN602	*1-560-896-00	PIN, CONNECTOR 8P	
CN603	*1-560-890-00	PIN, CONNECTOR 2P	
CN604	*1-560-890-00	PIN, CONNECTOR 2P	
CN605	*1-560-893-00	PIN, CONNECTOR 5P	
CN606	*1-560-890-00	PIN, CONNECTOR 2P	
CN607	*1-560-891-00	PIN, CONNECTOR 3P	
CN608	*1-560-890-00	PIN, CONNECTOR 2P	
CN609	*1-560-894-00	PIN, CONNECTOR 6P	
CN610	*1-560-896-00	PIN, CONNECTOR 8P	
CN611	*1-560-891-00	PIN, CONNECTOR 3P	
CN612	*1-560-891-00	PIN, CONNECTOR 3P	
CN613	*1-560-466-00	PIN, CONNECTOR 3P	

DIODE

Ref.No	Part No.	Description	Remark
D301	8-719-000-06	DIODE MC921	
D302	8-719-000-04	DIODE MC911	
D303	8-719-911-19	DIODE 1SS119	
D304	8-719-101-50	DIODE RD5.1E-L2	
D305	8-719-911-19	DIODE 1SS119	
D308	8-719-000-12	DIODE MC931	
D316	8-719-911-19	DIODE 1SS119	
D317	8-719-911-19	DIODE 1SS119	
D318	8-719-911-19	DIODE 1SS119	
D319	8-719-100-29	DIODE RD5.1E-B1	
D320	8-719-000-12	DIODE MC931	
D321	8-719-911-19	DIODE 1SS119	
D601	8-719-000-06	DIODE MC921	
D602	8-719-000-06	DIODE MC921	
D603	8-719-000-04	DIODE MC911	
D605	8-719-911-19	DIODE 1SS119	
D607	8-719-911-19	DIODE 1SS119	
D608	8-719-911-19	DIODE 1SS119	
D609	8-719-100-41	DIODE RD6.8E-B2	
D610	8-719-100-41	DIODE RD6.8E-B2	

IC

Ref.No	Part No.	Description	Remark
IC301	8-751-941-05	IC CX194B-5	
IC302	8-759-135-80	IC UPC358C	
IC303	8-759-145-58	IC UPC4558C	
IC304	8-759-132-40	IC UPC324C	
IC305	8-759-240-53	IC TC4053BP	
IC306	8-759-132-40	IC UPC324C	
IC601	8-759-911-08	IC MB88551-133M	
IC602	8-759-800-72	IC LA7205	
IC603	8-759-600-24	IC M54543L	
IC604	8-759-103-93	IC UPC393C	

COIL

Ref.No	Part No.	Description	Remark
L601	1-407-492-00	MICRO INDUCTOR 1MMH	

IC LINK

Ref.No	Part No.	Description	Remark
PS301⚠	1-532-637-00	LINK, IC 1A	
PS302⚠	1-532-679-00	LINK, IC 0.6A	
PS303⚠	1-532-605-00	LINK, IC 0.4A	
PS304⚠	1-532-637-00	LINK, IC 1A	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

TRANSISTOR

Ref.No	Part No.	Description	Remark
Q301	8-729-245-83	TRANSISTOR 2SC2458	
Q302	8-729-900-89	TRANSISTOR DTC144ES	
Q303	8-729-245-83	TRANSISTOR 2SC2458	
Q304	8-729-245-83	TRANSISTOR 2SC2458	
Q305	8-729-245-83	TRANSISTOR 2SC2458	
Q306	8-729-900-89	TRANSISTOR DTC144ES	
Q307	8-729-200-20	TRANSISTOR 2SK107-2	
Q308	8-729-245-83	TRANSISTOR 2SC2458	
Q312	8-729-245-83	TRANSISTOR 2SC2458	
Q313	8-729-245-83	TRANSISTOR 2SC2458	
Q314	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q315	8-729-316-16	TRANSISTOR 2SC1061	
Q316	8-729-245-83	TRANSISTOR 2SC2458	
Q317	8-729-245-83	TRANSISTOR 2SC2458	
Q318	8-729-245-83	TRANSISTOR 2SC2458	
Q321	8-729-177-43	TRANSISTOR 2SD774	
Q322	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q323	8-729-805-13	TRANSISTOR 2SC1475-13	
Q324	8-729-117-54	TRANSISTOR 2SA1175	
Q325	8-729-245-83	TRANSISTOR 2SC2458	
Q326	8-729-245-83	TRANSISTOR 2SC2458	
Q330	8-729-316-16	TRANSISTOR 2SC1061	
Q331	8-729-245-83	TRANSISTOR 2SC2458	
Q332	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q333	8-729-900-89	TRANSISTOR DTC144ES	
Q335	8-729-245-83	TRANSISTOR 2SC2458	
Q336	8-729-245-83	TRANSISTOR 2SC2458	
Q337	8-729-245-83	TRANSISTOR 2SC2458	
Q338	8-729-245-83	TRANSISTOR 2SC2458	
Q340	8-729-177-43	TRANSISTOR 2SD774	
Q341	8-729-900-89	TRANSISTOR DTC144ES	
Q342	8-729-900-89	TRANSISTOR DTC144ES	
Q343	8-729-245-83	TRANSISTOR 2SC2458	
Q344	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q345	8-729-900-65	TRANSISTOR DTA144ES	
Q346	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q347	8-729-900-89	TRANSISTOR DTC144ES	
Q348	8-729-245-83	TRANSISTOR 2SC2458	
Q349	8-729-900-89	TRANSISTOR DTC144ES	
Q356	8-729-900-61	TRANSISTOR DTA114ES	
Q601	8-729-116-42	TRANSISTOR 2SD1164	
Q602	8-729-116-42	TRANSISTOR 2SD1164	
Q603	8-729-177-43	TRANSISTOR 2SD774	
Q604	8-729-177-43	TRANSISTOR 2SD774	
Q605	8-729-245-83	TRANSISTOR 2SC2458	
Q606	8-729-245-83	TRANSISTOR 2SC2458	
Q607	8-729-245-83	TRANSISTOR 2SC2458	
Q608	8-729-245-83	TRANSISTOR 2SC2458	
Q615	8-729-900-69	TRANSISTOR DTA144WS	
Q616	8-729-900-89	TRANSISTOR DTC144ES	
Q617	8-729-204-83	TRANSISTOR 2SA1048-GR	
Q618	8-729-245-83	TRANSISTOR 2SC2458	
Q619	8-729-245-83	TRANSISTOR 2SC2458	
Q620	8-729-900-89	TRANSISTOR DTC144ES	
Q621	8-729-245-83	TRANSISTOR 2SC2458	
Q622	8-729-900-89	TRANSISTOR DTC144ES	
Q623	8-729-245-83	TRANSISTOR 2SC2458	
Q624	8-729-900-61	TRANSISTOR DTA114ES	

RESISTOR

Ref.No	Part No.	Description				Remark
R301	1-247-871-00	CARBON	47K	5%	1/6W	
R302	1-247-859-00	CARBON	15K	5%	1/6W	
R303	1-247-871-00	CARBON	47K	5%	1/6W	
R304	1-247-859-00	CARBON	15K	5%	1/6W	
R305	1-247-855-00	CARBON	10K	5%	1/6W	
R307	1-247-855-00	CARBON	10K	5%	1/6W	
R308	1-247-829-00	CARBON	820	5%	1/6W	
R309	1-247-881-00	CARBON	120K	5%	1/6W	
R310	1-247-835-00	CARBON	1.5K	5%	1/6W	
R311	1-247-863-00	CARBON	22K	5%	1/6W	
R312	1-247-864-00	CARBON	24K	5%	1/6W	
R313	1-247-831-00	CARBON	1K	5%	1/6W	
R314	1-247-835-00	CARBON	1.5K	5%	1/6W	
R315	1-247-829-00	CARBON	820	5%	1/6W	
R316	1-247-879-00	CARBON	100K	5%	1/6W	
R317	1-247-903-00	CARBON	1M	5%	1/6W	
R318	1-247-885-00	CARBON	180K	5%	1/6W	
R319	1-247-844-00	CARBON	3.6K	5%	1/6W	
R320	1-247-859-00	CARBON	15K	5%	1/6W	
R321	1-247-845-00	CARBON	3.9K	5%	1/6W	
R322	1-247-903-00	CARBON	1M	5%	1/6W	
R323	1-247-855-00	CARBON	10K	5%	1/6W	
R324	1-247-831-00	CARBON	1K	5%	1/6W	
R325	1-247-903-00	CARBON	1M	5%	1/6W	
R326	1-247-831-00	CARBON	1K	5%	1/6W	
R327	1-247-855-00	CARBON	10K	5%	1/6W	
R328	⚠ 1-212-850-00	FUSIBLE	5.1	5%	1/4W	F
R329	1-247-857-00	CARBON	12K	5%	1/6W	
R330	1-247-859-00	CARBON	15K	5%	1/6W	
R331	1-247-847-00	CARBON	4.7K	5%	1/6W	
R332	1-247-873-00	CARBON	56K	5%	1/6W	
R333	1-247-900-00	CARBON	750K	5%	1/6W	
R334	1-247-867-00	CARBON	33K	5%	1/6W	
R335	1-247-867-00	CARBON	33K	5%	1/6W	
R336	1-247-856-00	CARBON	11K	5%	1/6W	
R337	1-247-855-00	CARBON	10K	5%	1/6W	
R338	1-247-842-00	CARBON	3K	5%	1/6W	
R339	1-247-843-00	CARBON	3.3K	5%	1/6W	
R340	1-247-825-00	CARBON	560	5%	1/6W	
R341	1-247-871-00	CARBON	47K	5%	1/6W	
R342	1-247-855-00	CARBON	10K	5%	1/6W	
R343	1-247-865-00	CARBON	27K	5%	1/6W	
R344	1-247-872-00	CARBON	51K	5%	1/6W	
R345	1-247-865-00	CARBON	27K	5%	1/6W	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

SS-34

Ref.No	Part No.	Description				Remark
R346	1-247-848-00	CARBON	5.1K	5%	1/6W	
R347	1-247-887-00	CARBON	220K	5%	1/6W	
R348	1-247-887-00	CARBON	220K	5%	1/6W	
R349	1-247-845-00	CARBON	3.9K	5%	1/6W	
R352	1-247-871-00	CARBON	47K	5%	1/6W	
R353	1-247-867-00	CARBON	33K	5%	1/6W	
R354	1-247-855-00	CARBON	10K	5%	1/6W	
R355	1-247-887-00	CARBON	220K	5%	1/6W	
R356	1-247-871-00	CARBON	47K	5%	1/6W	
R357	1-247-871-00	CARBON	47K	5%	1/6W	
R358	1-247-863-00	CARBON	22K	5%	1/6W	
R359	1-247-863-00	CARBON	22K	5%	1/6W	
R361	1-247-871-00	CARBON	47K	5%	1/6W	
R362	1-247-861-00	CARBON	18K	5%	1/6W	
R363	1-247-879-00	CARBON	100K	5%	1/6W	
R364	1-247-867-00	CARBON	33K	5%	1/6W	
R365	1-247-867-00	CARBON	33K	5%	1/6W	
R366	1-247-867-00	CARBON	33K	5%	1/6W	
R367	1-247-859-00	CARBON	15K	5%	1/6W	
R368	⚠.1-206-482-00	METAL OXIDE	62	5%	2W	F
R370	1-247-871-00	CARBON	47K	5%	1/6W	
R371	1-247-867-00	CARBON	33K	5%	1/6W	
R372	1-247-855-00	CARBON	10K	5%	1/6W	
R373	1-247-883-00	CARBON	150K	5%	1/6W	
R374	1-247-883-00	CARBON	150K	5%	1/6W	
R375	1-247-883-00	CARBON	150K	5%	1/6W	
R376	1-247-883-00	CARBON	150K	5%	1/6W	
R377	1-247-879-00	CARBON	100K	5%	1/6W	
R378	1-247-879-00	CARBON	100K	5%	1/6W	
R379	1-247-879-00	CARBON	100K	5%	1/6W	
R380	1-247-879-00	CARBON	100K	5%	1/6W	
R381	1-247-867-00	CARBON	33K	5%	1/6W	
R382	1-247-867-00	CARBON	33K	5%	1/6W	
R383	1-247-897-00	CARBON	560K	5%	1/6W	
R384	1-247-897-00	CARBON	560K	5%	1/6W	
R386	1-247-857-00	CARBON	12K	5%	1/6W	
R387	1-246-981-00	CARBON	4.7	5%	1/8W	F
R389	⚠.1-212-366-00	METAL OXIDE	3.3	5%	1W	F
R390	1-247-855-00	CARBON	10K	5%	1/6W	
R391	1-247-845-00	CARBON	3.9K	5%	1/6W	
R392	1-247-819-00	CARBON	330	5%	1/6W	
R394	1-247-832-00	CARBON	1.1K	5%	1/6W	
R397	1-247-831-00	CARBON	1K	5%	1/6W	
R398	⚠.1-212-849-00	FUSIBLE	4.7	5%	1/4W	F
R399	⚠.1-212-360-00	METAL OXIDE	1	5%	1W	F
R400	1-247-828-00	CARBON	750	5%	1/6W	
R406	⚠.1-212-360-00	METAL OXIDE	1	5%	1W	F
R407	1-247-847-00	CARBON	4.7K	5%	1/6W	
R408	1-247-843-00	CARBON	3.3K	5%	1/6W	
R409	1-247-838-00	CARBON	2K	5%	1/6W	
R410	1-247-847-00	CARBON	4.7K	5%	1/6W	
R411	1-247-855-00	CARBON	10K	5%	1/6W	
R413	1-247-847-00	CARBON	4.7K	5%	1/6W	

Ref.No	Part No.	Description				Remark
R417	1-247-837-00	CARBON	1.8K	5%	1/6W	
R419	1-247-855-00	CARBON	10K	5%	1/6W	
R426	1-247-831-00	CARBON	1K	5%	1/6W	
R427	1-247-863-00	CARBON	22K	5%	1/6W	
R428	1-247-863-00	CARBON	22K	5%	1/6W	
R429	1-247-848-00	CARBON	5.1K	5%	1/6W	
R430	1-247-859-00	CARBON	15K	5%	1/6W	
R431	1-247-867-00	CARBON	33K	5%	1/6W	
R432	1-247-871-00	CARBON	47K	5%	1/6W	
R433	1-247-831-00	CARBON	1K	5%	1/6W	
R436	1-247-855-00	CARBON	10K	5%	1/6W	
R437	1-247-855-00	CARBON	10K	5%	1/6W	
R438	1-247-851-00	CARBON	6.8K	5%	1/6W	
R439	1-247-839-00	CARBON	2.2K	5%	1/6W	
R440	1-247-855-00	CARBON	10K	5%	1/6W	
R441	1-247-867-00	CARBON	33K	5%	1/6W	
R442	1-247-847-00	CARBON	4.7K	5%	1/6W	
R443	1-247-831-00	CARBON	1K	5%	1/6W	
R444	1-247-855-00	CARBON	10K	5%	1/6W	
R445	1-247-839-00	CARBON	2.2K	5%	1/6W	
R446	1-247-851-00	CARBON	6.8K	5%	1/6W	
R447	1-247-855-00	CARBON	10K	5%	1/6W	
R448	1-247-863-00	CARBON	22K	5%	1/6W	
R449	1-247-871-00	CARBON	47K	5%	1/6W	
R451	1-247-815-00	CARBON	220	5%	1/6W	
R452	1-247-847-00	CARBON	4.7K	5%	1/6W	
R453	1-247-843-00	CARBON	3.3K	5%	1/6W	
R454	1-247-843-00	CARBON	3.3K	5%	1/6W	
R455	1-247-843-00	CARBON	3.3K	5%	1/6W	
R461	1-247-843-00	CARBON	3.3K	5%	1/6W	
R462	1-247-903-00	CARBON	1M	5%	1/6W	
R463	1-247-871-00	CARBON	47K	5%	1/6W	
R464	1-247-871-00	CARBON	47K	5%	1/6W	
R465	1-247-863-00	CARBON	22K	5%	1/6W	
R466	1-247-843-00	CARBON	3.3K	5%	1/6W	
R467	1-247-847-00	CARBON	4.7K	5%	1/6W	
R469	1-247-863-00	CARBON	22K	5%	1/6W	
R470	1-247-863-00	CARBON	22K	5%	1/6W	
R471	1-247-825-00	CARBON	560	5%	1/6W	
R473	1-247-843-00	CARBON	3.3K	5%	1/6W	
R476	1-247-823-00	CARBON	470	5%	1/6W	
R601	1-247-835-00	CARBON	1.5K	5%	1/6W	
R602	1-247-864-00	CARBON	24K	5%	1/6W	
R603	1-247-864-00	CARBON	24K	5%	1/6W	
R604	1-247-864-00	CARBON	24K	5%	1/6W	
R612	1-247-827-00	CARBON	680	5%	1/6W	
R614	1-247-845-00	CARBON	3.9K	5%	1/6W	
R615	1-247-855-00	CARBON	10K	5%	1/6W	
R616	1-247-845-00	CARBON	3.9K	5%	1/6W	
R617	1-247-855-00	CARBON	10K	5%	1/6W	
R618	1-215-454-00	METAL	24K	1%	1/6W	
R619	1-247-863-00	CARBON	22K	5%	1/6W	
R620	1-247-873-00	CARBON	56K	5%	1/6W	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description	Remark
R621	1-247-851-00	CARBON 6.8K 5% 1/6W	
R622	1-247-855-00	CARBON 10K 5% 1/6W	
R623	1-247-861-00	CARBON 18K 5% 1/6W	
R624	1-247-839-00	CARBON 2.2K 5% 1/6W	
R626	1-247-879-00	CARBON 100K 5% 1/6W	
R627	1-247-855-00	CARBON 10K 5% 1/6W	
R628	1-247-855-00	CARBON 10K 5% 1/6W	
R629	1-247-895-00	CARBON 470K 5% 1/6W	
R630	1-247-839-00	CARBON 2.2K 5% 1/6W	
R631	1-247-859-00	CARBON 15K 5% 1/6W	
R632	1-247-855-00	CARBON 10K 5% 1/6W	
R633	1-247-839-00	CARBON 2.2K 5% 1/6W	
R634	1-247-879-00	CARBON 100K 5% 1/6W	
R635	1-247-869-00	CARBON 39K 5% 1/6W	
R636	1-247-835-00	CARBON 1.5K 5% 1/6W	
R637	1-247-104-00	CARBON 75 5% 1/4W	
R639	1-247-855-00	CARBON 10K 5% 1/6W	
R640	1-247-875-00	CARBON 68K 5% 1/6W	
R642	1-247-843-00	CARBON 3.3K 5% 1/6W	
R643	1-247-839-00	CARBON 2.2K 5% 1/6W	
R644	1-247-864-00	CARBON 24K 5% 1/6W	
R645	1-247-871-00	CARBON 47K 5% 1/6W	
R646	1-247-851-00	CARBON 6.8K 5% 1/6W	
R647	1-247-831-00	CARBON 1K 5% 1/6W	
R648	1-246-449-00	CARBON 100 5% 1/6W	
R649	1-247-855-00	CARBON 10K 5% 1/6W	
		VARIABLE RESISTOR	
RV301	1-228-994-00	RES, ADJ, METAL GLAZE 10K	
RV302	1-228-994-00	RES, ADJ, METAL GLAZE 10K	
RV303	1-228-996-00	RES, ADJ, METAL GLAZE 47K	
RV304	1-228-750-00	RES, ADJ, CARBON 47K	
RV305	1-228-750-00	RES, ADJ, CARBON 47K	
RV306	1-228-750-00	RES, ADJ, CARBON 47K	
RV307	1-228-991-00	RES, ADJ, METAL GLAZE 2.2K	
RV308	1-228-990-00	RES, ADJ, METAL GLAZE 1K	
RV310	1-228-994-00	RES, ADJ, METAL GLAZE 10K	
RV601	1-228-270-00	RES, VAR, CARBON 10K	
RV602	1-228-996-00	RES, ADJ, METAL GLAZE 47K	
RV603	1-228-996-00	RES, ADJ, METAL GLAZE 47K	
		THERMISTOR	
TH301	1-800-200-00	THERMISTOR S-3K	
TH302	1-800-198-XX	THERMISTOR S-1K	

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Ref.No	Part No.	Description	Remark
	*1-614-220-11	ES-3 BOARD ***********	
		CAPACITOR	
C701	1-123-381-00	ELECT 2.2MF 20% 50V	
C702	1-127-475-00	ELECT(SOLID) 0.22MF 5% 25V	
		DIODE	
D701	8-719-000-06	DIODE MC921	
		IC	
IC701	8-759-045-38	IC MC14538BCP	
		TRANSISTOR	
Q701	8-729-900-89	TRANSISTOR DTC144ES	
		RESISTOR	
R701	1-247-879-00	CARBON 100K 5% 1/6W	
R702	1-247-855-00	CARBON 10K 5% 1/6W	
R703	1-247-863-00	CARBON 22K 5% 1/6W	
R704	1-247-871-00	CARBON 47K 5% 1/6W	

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Ref.No	Part No.	Description	Remark
	*1-613-224-11	FU-35 BOARD ************	
		DIODE	
D001	8-719-908-50	DIODE SLR-54MC3	
		RESISTOR	
R001	1-247-123-00	CARBON 470 5% 1/4W	
R002	1-247-851-00	CARBON 6.8K 5% 1/6W	
R003	1-247-851-00	CARBON 6.8K 5% 1/6W	
R004	1-247-855-00	CARBON 10K 5% 1/6W	
R005	1-247-855-00	CARBON 10K 5% 1/6W	
R006	1-247-161-00	CARBON 18K 5% 1/4W	
		VARIABLE RESISTOR	
RV001	1-230-421-11	RES, VAR, CARBON 100K	
		SWITCH	
S001	1-554-174-00	SWITCH, KEY BOARD	
S002	1-554-174-00	SWITCH, KEY BOARD	
S003	1-554-174-00	SWITCH, KEY BOARD	

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description			Remark
S004	1-554-174-00	SWITCH, KEY BOARD			
S005	1-554-174-00	SWITCH, KEY BOARD			
S006	1-554-174-00	SWITCH, KEY BOARD			
S007	1-554-174-00	SWITCH, KEY BOARD			
S008	1-554-174-00	SWITCH, KEY BOARD			

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*A-6721-205-A TA-22 BOARD, COMPLETE
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Part No.	Description
*1-556-934-00	CABLE, PIN
*3-662-227-00	HOLDER (R-3), LED
*3-662-383-00	BAND, RETAINER, TUNER
*3-674-390-00	HOLDER (B), LED
*3-687-523-01	LID, UPPER, SHIELD CASE, TU
*3-687-524-01	LID, BOTTOM, SHIELD CASE, TU
*3-687-525-01	CASE (MAIN), SHIELD, TU
*3-687-550-01	CASE (UPPER LID), SHIELD, AU
*3-687-558-01	CASE (MAIN), SHIELD, AU
*3-687-559-01	CASE (BOTTOM LID), SHIELD, AU
*4-336-029-00	PLATE, SHIELD

CAPACITOR

Ref.No	Part No.	Description			Remark
C001	1-102-530-00	CERAMIC	120PF	5%	50V
C002	1-102-529-00	CERAMIC	100PF	5%	50V
C003	1-102-508-00	CERAMIC	10PF	0.5PF	50V
C004	1-102-523-00	CERAMIC	56PF	5%	50V
C006	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C007	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C008	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C009	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C010	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C011	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C012	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C013	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C014	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C015	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C016	1-123-369-00	ELECT	4.7MF	20%	25V
C017	1-161-013-00	CERAMIC	0.01MF	20%	25V
C018	1-123-356-00	ELECT	10MF	20%	16V
C019	1-161-013-00	CERAMIC	0.01MF	20%	25V
C020	1-123-356-00	ELECT	10MF	20%	16V
C021	1-102-129-00	CERAMIC	0.01MF	10%	50V
C022	1-102-529-00	CERAMIC	100PF	5%	50V
C023	1-102-518-00	CERAMIC	33PF	5%	50V
C024	1-102-504-00	CERAMIC	4PF	0.25PF	50V
C025	1-102-504-00	CERAMIC	4PF	0.25PF	50V
C026	1-102-518-00	CERAMIC	33PF	5%	50V
C027	1-102-529-00	CERAMIC	100PF	5%	50V
C028	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C029	1-123-356-00	ELECT	10MF	20%	16V
C030	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C031	1-123-379-00	ELECT	0.47MF	20%	50V

Ref.No	Part No.	Description			Remark
C032	1-101-004-00	CERAMIC	0.01MF		50V
C033	1-101-004-00	CERAMIC	0.01MF		50V
C034	1-123-318-00	ELECT	33MF	20%	16V
C035	1-102-978-00	CERAMIC	220PF	5%	50V
C036	1-102-959-00	CERAMIC	22PF	5%	50V
C037	1-102-959-00	CERAMIC	22PF	5%	50V
C038	1-101-004-00	CERAMIC	0.01MF		50V
C039	1-101-004-00	CERAMIC	0.01MF		50V
C040	1-161-030-00	CERAMIC	0.0047MF	20%	25V
C041	1-161-013-00	CERAMIC	0.01MF	20%	25V
C042	1-102-959-00	CERAMIC	22PF	5%	50V
C043	1-101-004-00	CERAMIC	0.01MF		50V
C044	1-123-318-00	ELECT	33MF	20%	16V
C045	1-123-318-00	ELECT	33MF	20%	16V
C050	1-123-356-00	ELECT	10MF	20%	50V
C051	1-123-356-00	ELECT	10MF	20%	50V
C052	1-123-356-00	ELECT	10MF	20%	16V
C053	1-123-356-00	ELECT	10MF	20%	50V
C054	1-102-973-00	CERAMIC	100PF	5%	50V
C055	1-130-495-51	MYLAR	0.1MF	5%	50V
C056	1-130-493-51	MYLAR	0.068MF	5%	50V
C057	1-130-493-51	MYLAR	0.068MF	5%	50V
C058	1-102-963-00	CERAMIC	33PF	5%	50V
C059	1-123-380-00	ELECT	1MF	20%	50V
C060	1-123-381-00	ELECT	2.2MF	20%	50V
C061	1-102-518-00	CERAMIC	33PF	5%	50V
C062	1-102-518-00	CERAMIC	33PF	5%	50V
C063	1-101-004-00	CERAMIC	0.01MF		50V
C064	1-101-004-00	CERAMIC	0.01MF		50V
C065	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C066	1-101-004-00	CERAMIC	0.01MF		50V
C067	1-101-006-00	CERAMIC	0.047MF		50V
C068	1-101-006-00	CERAMIC	0.047MF		50V
C301	1-123-356-00	ELECT	10MF	20%	16V
C302	1-123-321-51	ELECT	220MF	20%	16V
C303	1-123-321-51	ELECT	220MF	20%	16V
C304	1-123-356-00	ELECT	10MF	20%	16V
C305	1-123-356-00	ELECT	10MF	20%	16V
C306	1-130-487-00	MYLAR	0.022MF	5%	50V
C307	1-123-380-00	ELECT	1MF	20%	50V
C308	1-123-380-00	ELECT	1MF	20%	50V
C309	1-123-318-00	ELECT	33MF	20%	16V
C310	1-123-306-00	ELECT	47MF	20%	6.3V
C311	1-130-491-51	MYLAR	0.047MF	5%	50V
C312	1-130-483-00	MYLAR	0.01MF	5%	50V
C313	1-123-318-00	ELECT	33MF	20%	16V
C314	1-123-318-00	ELECT	33MF	20%	16V
C315	1-123-380-00	ELECT	1MF	20%	50V
C316	1-130-471-00	MYLAR	0.001MF	5%	50V
C317	1-123-380-00	ELECT	1MF	20%	50V
C318	1-102-111-00	CERAMIC	270PF	10%	50V
C319	1-130-485-51	MYLAR	0.015MF	5%	50V
C320	1-123-380-00	ELECT	1MF	20%	50V

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description			Remark
C321	1-123-369-00	ELECT	4.7MF	20%	25V
C323	1-123-607-00	ELECT	0.1MF	20%	50V
C331	1-123-332-00	ELECT	47MF	20%	16V
C332	1-161-013-00	CERAMIC	0.01MF	10%	25V
C333	1-161-055-00	CERAMIC	0.022MF	10%	25V
C334	1-107-166-00	MICA	62PF	5%	500V
C335	1-129-712-00	FILM	0.0068MF	10%	630V

CERAMIC DISCRIMINATOR

CD001	1-404-380-00	DISCRIMINATOR, CERAMIC 5.5MHZ

FILTER

CF001	1-527-263-00	CERAMIC FILTER (5.5MHZ)

CONNECTOR

CN001	*1-560-893-00	PIN, CONNECTOR 5P
CN002	*1-560-893-00	PIN, CONNECTOR 5P
CN003	*1-560-900-00	PIN, CONNECTOR 12P
CN301	*1-508-797-00	PIN, CONNECTOR 4P
CN302	*1-560-893-00	PIN, CONNECTOR 5P
CN303	*1-508-743-00	PIN, CONNECTOR 5P

TRIMMER

CT001	1-404-134-00	TRAP, CERAMIC (5.5MHZ)

CERAMIC

CX001	1-527-822-00	OSCILLATOR, CERAMIC

DIODE

D001	8-719-812-31	DIODE TLR123
D002	8-719-812-32	DIODE TLY123
D003	8-719-812-33	DIODE TLG123A
D004	8-719-911-19	DIODE 1SS119
D005	8-719-911-19	DIODE 1SS119
D009	8-719-911-19	DIODE 1SS119
D010	8-719-812-31	DIODE TLR123
D011	8-719-812-31	DIODE TLR123
D013	8-719-911-19	DIODE 1SS119
D301	8-719-911-19	DIODE 1SS119
D302	8-719-911-19	DIODE 1SS119
D303	8-719-000-12	DIODE MC931
D304	8-719-911-19	DIODE 1SS119

IC

Ref.No	Part No.	Description
IC001	8-759-276-07	IC TA7607AP
IC002	8-759-193-91	IC UPC1391H
IC003	8-759-800-12	IC LA7920
IC004	8-759-157-40	IC UPC574J
IC005	8-759-602-05	IC M50160-019SP
IC006	8-759-600-66	IC M58653P
IC301	8-752-006-10	IC CX20061
IC302	8-759-101-73	IC UPC1513HA
IC303	8-759-911-23	IC BA5115

COIL

L001	1-408-591-00	MICRO INDUCTOR 1UH
L002	1-408-600-00	MICRO INDUCTOR 5.6UH
L003	1-408-600-00	MICRO INDUCTOR 5.6UH
L004	1-408-615-00	MICRO INDUCTOR 100UH
L005	1-408-603-00	MICRO INDUCTOR 10UH
L006	1-408-599-00	MICRO INDUCTOR 4.7UH
L007	1-408-606-00	MICRO INDUCTOR 18UH
L008	1-408-607-00	MICRO INDUCTOR 22UH
L009	1-407-177-XX	MICRO INDUCTOR 470UH
L301	1-407-963-00	MICRO INDUCTOR 15MMH
L302	1-408-221-00	MICRO INDUCTOR 22MMH
L331	1-407-710-00	MICRO INDUCTOR 270UH

TRANSISTOR

Q001	8-729-203-28	TRANSISTOR 2SC2216
Q002	8-729-245-83	TRANSISTOR 2SC2458
Q003	8-729-245-83	TRANSISTOR 2SC2458
Q004	8-729-113-32	TRANSISTOR 2SB733
Q005	8-729-603-50	TRANSISTOR 2SC403SP
Q006	8-729-245-83	TRANSISTOR 2SC2458
Q007	8-729-245-83	TRANSISTOR 2SC2458
Q008	8-729-204-83	TRANSISTOR 2SA1048-GR
Q301	⚠.8-729-178-54	TRANSISTOR 2SC2785
Q302	8-729-245-83	TRANSISTOR 2SC2458
Q303	8-729-245-83	TRANSISTOR 2SC2458
Q331	8-729-173-37	TRANSISTOR 2SA733-P
Q332	8-729-967-32	TRANSISTOR 2SC2673

RESISTOR

					Remark
R001	1-247-847-00	CARBON	4.7K	5%	1/6W
R002	1-247-839-00	CARBON	2.2K	5%	1/6W
R003	1-247-815-00	CARBON	220	5%	1/6W
R004	1-247-813-00	CARBON	180	5%	1/6W
R005	1-247-819-00	CARBON	330	5%	1/6W
R006	1-247-837-00	CARBON	1.8K	5%	1/6W
R007	1-247-835-00	CARBON	1.5K	5%	1/6W
R008	1-247-839-00	CARBON	2.2K	5%	1/6W
R009	1-247-877-00	CARBON	82K	5%	1/6W
R010	1-247-867-00	CARBON	33K	5%	1/6W
R011	1-247-879-00	CARBON	100K	5%	1/6W
R012	1-247-879-00	CARBON	100K	5%	1/6W
R013	1-247-901-00	CARBON	820K	5%	1/6W
R014	1-247-863-00	CARBON	22K	5%	1/6W
R015	1-247-855-00	CARBON	10K	5%	1/6W
R016	1-247-829-00	CARBON	820	5%	1/6W
R018	1-247-831-00	CARBON	1K	5%	1/6W
R019	1-247-813-00	CARBON	180	5%	1/6W
R020	1-247-807-00	CARBON	100	5%	1/6W
R021	1-247-831-00	CARBON	1K	5%	1/6W

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

TA-22

Ref.No	Part No.	Description				Remark
R022	1-247-829-00	CARBON	820	5%	1/6W	
R024	1-247-831-00	CARBON	1K	5%	1/6W	
R025	1-247-831-00	CARBON	1K	5%	1/6W	
R026	1-247-817-00	CARBON	270	5%	1/6W	
R027	1-247-847-00	CARBON	4.7K	5%	1/6W	
R028	1-247-821-00	CARBON	390	5%	1/6W	
R031	⚠ 1-212-849-00	FUSIBLE	4.7	5%	1/4W	F
R032	⚠ 1-213-146-00	METAL OXIDE	1.8K	5%	1W	F
R033	1-247-851-00	CARBON	6.8K	5%	1/6W	
R034	1-247-865-00	CARBON	27K	5%	1/6W	
R035	1-247-855-00	CARBON	10K	5%	1/6W	
R036	1-247-879-00	CARBON	100K	5%	1/6W	
R037	1-247-879-00	CARBON	100K	5%	1/6W	
R038	1-247-839-00	CARBON	2.2K	5%	1/6W	
R039	1-247-835-00	CARBON	1.5K	5%	1/6W	
R040	1-247-833-00	CARBON	1.2K	5%	1/6W	
R041	1-247-887-00	CARBON	220K	5%	1/6W	
R042	⚠ 1-213-146-00	METAL OXIDE	1.8K	5%	1W	F
R043	1-247-863-00	CARBON	22K	5%	1/6W	
R044	1-247-863-00	CARBON	22K	5%	1/6W	
R045	1-247-863-00	CARBON	22K	5%	1/6W	
R046	1-247-863-00	CARBON	22K	5%	1/6W	
R047	1-247-863-00	CARBON	22K	5%	1/6W	
R048	1-247-891-00	CARBON	330K	5%	1/6W	
R049	1-247-839-00	CARBON	2.2K	5%	1/6W	
R050	1-247-851-00	CARBON	6.8K	5%	1/6W	
R051	1-247-843-00	CARBON	3.3K	5%	1/6W	
R052	1-247-815-00	CARBON	220	5%	1/6W	
R055	1-247-863-00	CARBON	22K	5%	1/6W	
R059	1-247-863-00	CARBON	22K	5%	1/6W	
R060	1-247-863-00	CARBON	22K	5%	1/6W	
R061	1-247-863-00	CARBON	22K	5%	1/6W	
R062	1-247-863-00	CARBON	22K	5%	1/6W	
R063	1-247-831-00	CARBON	1K	5%	1/6W	
R064	1-247-831-00	CARBON	1K	5%	1/6W	
R068	1-247-847-00	CARBON	4.7K	5%	1/6W	
R069	1-247-863-00	CARBON	22K	5%	1/6W	
R070	1-247-855-00	CARBON	10K	5%	1/6W	
R071	1-247-855-00	CARBON	10K	5%	1/6W	
R073	1-247-853-00	CARBON	8.2K	5%	1/6W	
R074	1-247-147-00	CARBON	4.7K	5%	1/4W	
R075	1-247-847-00	CARBON	4.7K	5%	1/6W	
R302	1-247-879-00	CARBON	100K	5%	1/6W	
R303	1-247-833-00	CARBON	1.2K	5%	1/6W	
R304	1-247-839-00	CARBON	2.2K	5%	1/6W	
R305	1-247-875-00	CARBON	68K	5%	1/6W	
R306	1-247-837-00	CARBON	1.8K	5%	1/6W	
R308	1-247-871-00	CARBON	47K	5%	1/6W	
R310	1-247-843-00	CARBON	3.3K	5%	1/6W	
R311	1-247-855-00	CARBON	10K	5%	1/6W	
R312	1-247-871-00	CARBON	47K	5%	1/6W	
R313	1-247-855-00	CARBON	10K	5%	1/6W	
R314	1-247-875-00	CARBON	68K	5%	1/6W	

Ref.No	Part No.	Description				Remark
R315	1-210-825-00	SOLID	3.3M	5%	1/4W	
R316	1-247-883-00	CARBON	150K	5%	1/6W	
R317	1-247-863-00	CARBON	22K	5%	1/6W	
R318	1-247-875-00	CARBON	68K	5%	1/6W	
R319	1-247-859-00	CARBON	15K	5%	1/6W	
R320	1-247-891-00	CARBON	330K	5%	1/6W	
R321	1-247-827-00	CARBON	680	5%	1/6W	
R322	1-247-887-00	CARBON	220K	5%	1/6W	
R323	1-247-863-00	CARBON	22K	5%	1/6W	
R324	1-247-841-00	CARBON	2.7K	5%	1/6W	
R325	1-247-859-00	CARBON	15K	5%	1/6W	
R326	1-247-819-00	CARBON	330	5%	1/6W	
R327	1-247-871-00	CARBON	47K	5%	1/6W	
R328	1-247-783-00	CARBON	10	5%	1/6W	
R329	1-247-875-00	CARBON	68K	5%	1/6W	
R330	⚠ 1-246-873-11	CARBON	22	5%	1/4W	F
R331	1-247-867-00	CARBON	33K	5%	1/6W	
R332	1-247-847-00	CARBON	4.7K	5%	1/6W	
R333	1-247-859-00	CARBON	15K	5%	1/6W	
R334	⚠ 1-247-771-00	CARBON	3.3	5%	1/8W	F
R335	1-247-855-00	CARBON	10K	5%	1/6W	
R336	1-247-901-00	CARBON	820K	5%	1/6W	

BARIABLE RESISTOR

RV001	1-228-746-00	RES, ADJ, CARBON 2.2K
RV301	1-228-749-00	RES, ADJ, CARBON 22K
RV331	1-228-998-00	RES, ADJ, METAL GLAZE 220K

SWITCH

S001	1-553-997-00	SWITCH, KEY BOARD
S002	1-553-997-00	SWITCH, KEY BOARD
S003	1-553-997-00	SWITCH, KEY BOARD
S004	1-553-997-00	SWITCH, KEY BOARD
S005	1-553-997-00	SWITCH, KEY BOARD
S006	1-553-997-00	SWITCH, KEY BOARD
S007	1-553-997-00	SWITCH, KEY BOARD

FILTER

SF001	1-404-433-00	SAWF

TRANSFORMER

T001	1-404-476-00	COIL, IF
T002	1-404-476-00	COIL, IF
T003	1-404-428-00	VIFT
T004	1-404-427-00	VIFT
T005	1-404-427-00	VIFT
T331	1-433-275-00	TRANSFORMER, BIAS OSCILLATOR

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When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description	Remark
	*1-613-234-11	MT-10 BOARD	

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TUNER

Ref.No	Part No.	Description	Remark
TU001	⚠1-463-421-21	TUNER, ET (BT-883)	

****

Ref.No	Part No.	Description	Remark
	*1-613-233-11	RD-21 BOARD	

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DIODE

Ref.No	Part No.	Description	Remark
PC101	8-719-913-41	DIODE SPI201-22	

RESISTOR

Ref.No	Part No.	Description	Remark
R101	1-247-815-00	CARBON 220 5% 1/6W	
R102	1-247-867-00	CARBON 33K 5% 1/6W	
R103	1-247-859-00	CARBON 15K 5% 1/6W	

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Ref.No	Part No.	Description	Remark
	*1-613-232-11	RD-20 BOARD	

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DIODE

Ref.No	Part No.	Description	Remark
PC001	8-719-913-41	DIODE SPI201-22	

RESISTOR

Ref.No	Part No.	Description	Remark
R001	1-247-815-00	CARBON 220 5% 1/6W	
R002	1-247-867-00	CARBON 33K 5% 1/6W	
R003	1-247-859-00	CARBON 15K 5% 1/6W	

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Ref.No	Part No.	Description	Remark
	*1-606-794-00	N BOARD	

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CAPACITOR

Ref.No	Part No.	Description	Remark
C001	1-123-617-00	ELECT 10MF 20% 16V	
C002	1-123-617-00	ELECT 10MF 20% 16V	
C003	1-123-617-00	ELECT 10MF 20% 16V	
C004	1-161-057-00	CERAMIC 0.033MF 10% 25V	
C005	1-106-184-00	MYLAR 0.0033MF 5% 50V	
C006	1-123-821-00	ELECT 47MF 20% 16V	

DIODE

Ref.No	Part No.	Description	Remark
D001	8-719-110-32	DIODE PH302B	

IC

Ref.No	Part No.	Description	Remark
IC001	8-759-102-84	IC UPC1373HA	

COIL

Ref.No	Part No.	Description	Remark
L001	1-404-310-00	COIL	

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Ref.No	Part No.	Description	Remark
	*1-613-227-11	PS-45 BOARD	

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Ref.No	Part No.	Description	Remark
	1-533-162-00	HOLDER, FUSE	

CAPACITOR

Ref.No	Part No.	Description	Remark
C001	⚠1-130-710-00	FILM 0.1MF 20% 250V	
C002	1-125-298-00	ELECT(BLOCK) 10000MF 20% 25V	
C003	1-123-332-00	ELECT 47MF 20% 16V	
C004	1-123-332-00	ELECT 47MF 20% 16V	

CONNECTOR

Ref.No	Part No.	Description	Remark
CN001	*1-560-893-00	PIN, CONNECTOR 5P	
CN002	*1-560-890-00	PIN, CONNECTOR 2P	

DIODE

Ref.No	Part No.	Description	Remark
D001	⚠8-719-505-20	DIODE S5VB20	

FUSE

Ref.No	Part No.	Description	Remark
F001	⚠1-532-203-11	FUSE, TIME-LAG T2A 250V	
F002	⚠1-532-350-11	FUSE, TIME-LAG T4A 250V	

RESISTOR

Ref.No	Part No.	Description	Remark
R001	1-247-823-00	CARBON 470 5% 1/6W	

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Ref.No	Part No.	Description	Remark
	*1-613-228-11	PS-46 BOARD	

****

Ref.No	Part No.	Description	Remark
	1-533-162-00	HOLDER, FUSE	
	*3-660-552-00	HEAT SINK	
	7-685-647-71	SCREW +BVTP 3X10 TYPE2 IT-3	

CAPACITOR

Ref.No	Part No.	Description	Remark
C101	1-123-375-00	ELECT 220MF 20% 63V	
C102	1-123-375-00	ELECT 220MF 20% 63V	
C103	1-123-330-00	ELECT 22MF 20% 16V	
C104	1-123-330-00	ELECT 22MF 20% 16V	

CONNECTOR

Ref.No	Part No.	Description	Remark
CN101	*1-560-894-00	PIN, CONNECTOR 6P	
CN102	*1-560-893-00	PIN, CONNECTOR 5P	
CN103	*1-560-891-00	PIN, CONNECTOR 3P	
CN104	*1-560-894-00	PIN, CONNECTOR 6P	
CN105	*1-560-892-00	PIN, CONNECTOR 4P	

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When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description	Remark
CN106	*1-560-891-00	PIN, CONNECTOR 3P	
		DIODE	
D101	8-719-200-02	DIODE 10E2	
D102	8-719-200-02	DIODE 10E2	
D103	8-719-100-39	DIODE RD6.2E-B3	
D105	8-719-200-02	DIODE 10E2	
		FUSE	
F101	⚠1-532-279-11	FUSE, TIME-LAG T500mA 250V	
		TRANSISTOR	
Q101	8-729-316-16	TRANSISTOR 2SC1061	
Q102	8-729-245-83	TRANSISTOR 2SC2458	
Q103	8-729-316-16	TRANSISTOR 2SC1061	
Q104	8-729-178-54	TRANSISTOR 2SC2785	
		RESISTOR	
R101	1-244-887-51	CARBON 3.9K 5% 1/2W	
R102	1-244-891-51	CARBON 5.6K 5% 1/2W	
R103	1-247-851-00	CARBON 6.8K 5% 1/6W	
R104	1-247-847-00	CARBON 4.7K 5% 1/6W	
R105	1-247-855-00	CARBON 10K 5% 1/6W	
R106	⚠1-213-144-00	METAL OXIDE 1.2K 5% 1W	F
R107	⚠1-206-477-00	METAL OXIDE 39 5% 2W	F
R111	1-247-783-00	CARBON 10 5% 1/6W	

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	*1-613-940-11	PS-69 BOARD	
		IC	
IC001	8-749-912-29	IC STR1229	

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	*1-605-071-00	LM-8 BOARD	
		CAPACITOR	
C101	1-161-057-00	CERAMIC 0.033MF 10% 50V	
C102	1-161-057-00	CERAMIC 0.033MF 10% 50V	
		COIL	
L101	1-408-120-00	MICRO INDUCTOR 18UH	
L102	1-408-120-00	MICRO INDUCTOR 18UH	

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Ref.No	Part No.	Description	Remark
		MISCELLANEOUS	
	A-6710-075-A	ACE ASSY	
	⚠1-464-388-11	BOOSTER MIXER, RF MODULATOR (RFU-821)	
	⚠1-551-908-41	CORD, POWER	
	8-825-508-10	HEAD, FE (FULL ERASE HEAD)	
L901	1-464-330-11	SENSOR, S COIL	
L902	1-464-329-31	SENSOR, T COIL	
M902	8-838-080-01	MOTOR, DC (BHF-1908B)(CAPSTAN MOTOR)	
M903	*A-4910-049-A	R STATOR BOARD, COMPLETE (REEL MOTOR)	
M904	X-3679-268-1	MOTOR ASSY, L (LOADING/THREADING)	
PM901	⚠1-454-349-41	SOLENOID, PLUNGER (PINCH)	
PM902	⚠1-454-371-31	SOLENOID, PLUNGER (BRAKE)	
S901	1-554-839-11	SWITCH, LEAF (2 GANG) (REC PROOF/CASSETTE DOWN)	
S903	1-554-840-11	SWITCH, LEAF (THREADING END)	
S904	1-554-840-11	SWITCH, LEAF (CASSETTE ON)	
T901	⚠1-447-894-11	TRANSFORMER, POWER	

* * *

ACCESSORIES AND PACKING MATERIALS

Part No.	Description	Remark
A-6765-566-A	COMMANDER ASSY RMT-231/SILVER	
A-6765-639-A	COMMANDER ASSY RMT-231/GRAY	
1-556-893-00	CORD ASSY, COAXIAL	
3-656-301-00	SCREWDRIVER, CONTROL	
*3-677-503-00	SHEET, PROTECTION	
3-681-287-01	LID, ACCESSORY CASE	
3-684-259-01	CASE, ACCESSORY	
*3-687-580-01	CUSHION (UPPER)	
*3-687-581-01	CUSHION (LOWER)	
*3-687-584-01	INDIVIDUAL CARTON (GRAY MODEL)	
*3-687-584-11	INDIVIDUAL CARTON (SILVER MODEL)	
3-701-630-00	BAG, POLYETHYLENE	
3-760-099-41	MANUAL, INSTRUCTION (ENGLISH/GERMAN)	

* * *

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

SECTION 7
ADJUSTMENT

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1. PREPARATION FOR MECHANICAL SECTION CHECK, ADJUSTMENT AND REPLACEMENT

1-1. DISASSEMBLY OF CABINET

1) Remove the four case set screws ❶ .
2) Remove the upper case ❷ in the direction shown by the arrow Ⓐ .
3) Loosen the eight screws (BVTP3 x 8) ❸ .
4) Remove the lower case ❹ in the direction shown by the arrow Ⓑ .
5) Remove the three screws (BVTP3 x 8) ❺ .
6) Remove the two claws ❻ in the direction shown by the arrow Ⓒ , then remove the front panel ❼ in the direction shown by the arrow Ⓓ .

Note: Follow the disassembly procedure in the numerical order given.

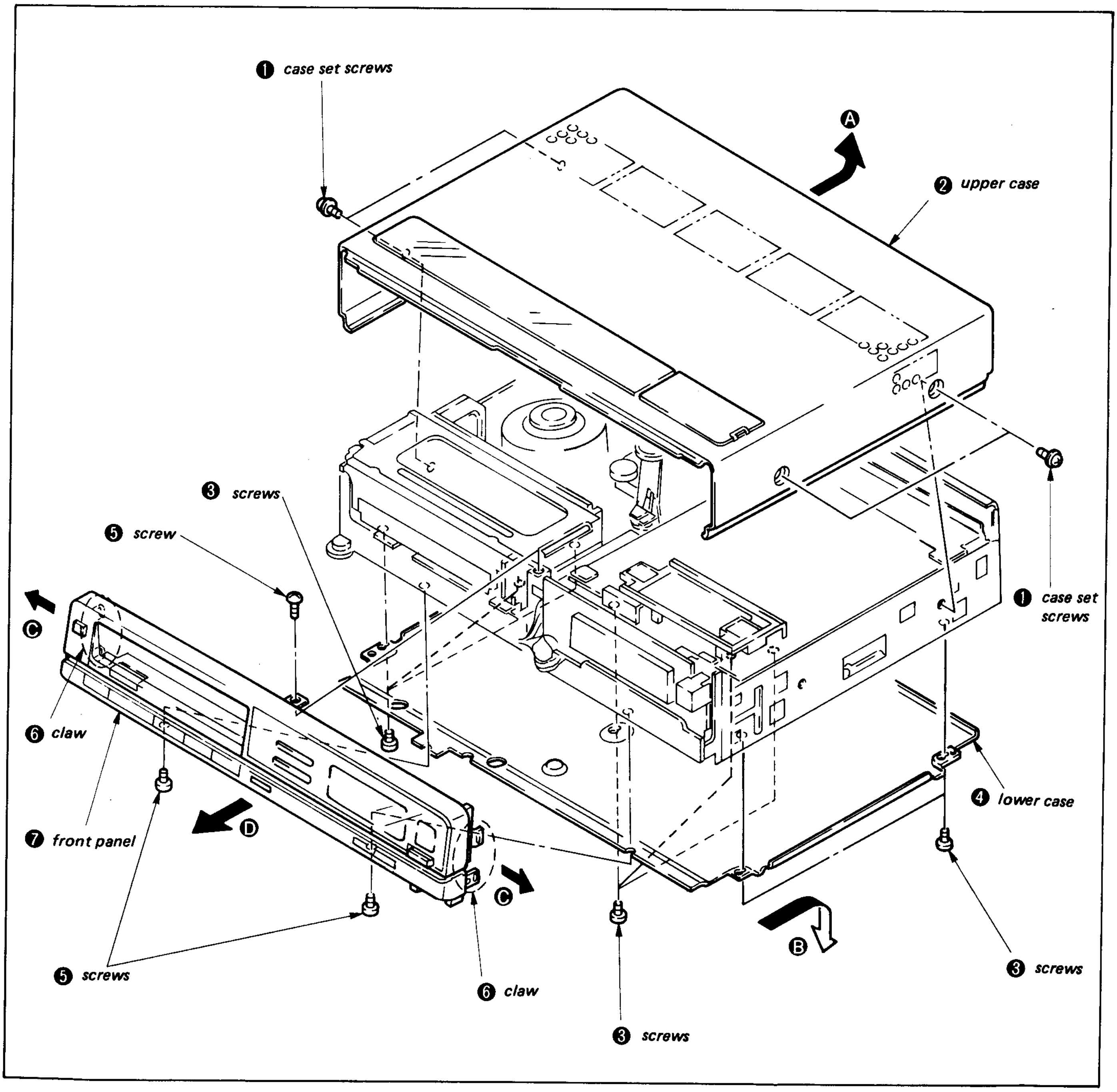

❶ case set screws
Ⓐ
❷ upper case
❸ screws
❺ screw
Ⓒ
❶ case set screws
❻ claw
❹ lower case
❼ front panel
Ⓓ
Ⓒ
Ⓑ
❺ screws
❸ screws
❻ claw
❸ screws

Fig. 1-1. Disassembly of Cabinet

1-2. REMOVAL OF THE RP-20 BOARD

1) Pull out the connector CN501 ❶ .
2) Remove the two screws (BVTP3 x 8) ❷ .
3) Pull out the three connectors (CN503, CN504) ❸ , ❹ .
4) Remove the two shield cases ❺ in the direction shown by the arrows Ⓐ and Ⓑ .

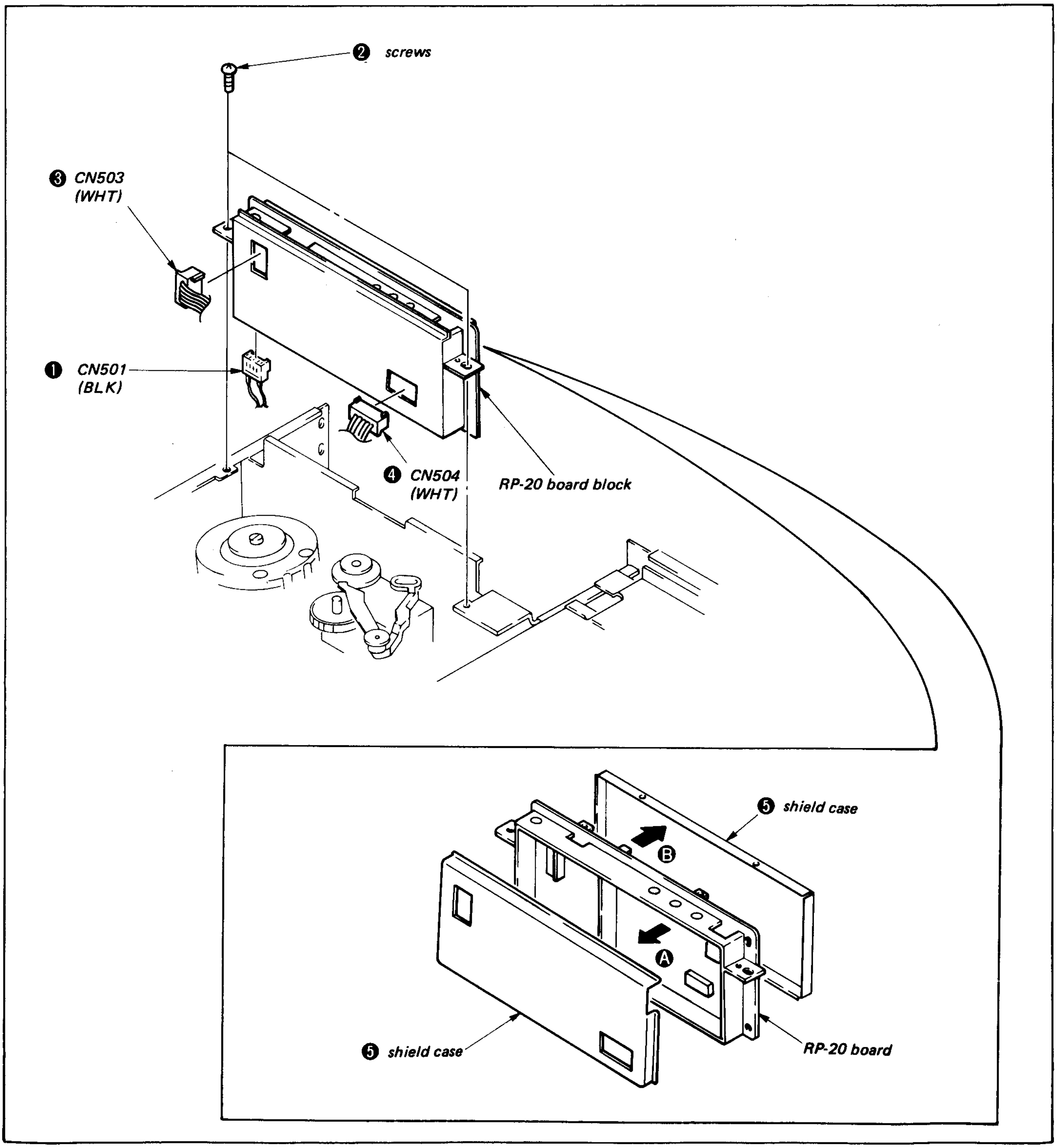

❷ screws
❸ CN503 (WHT)
❶ CN501 (BLK)
❹ CN504 (WHT)
RP-20 board block
❺ shield case
Ⓑ
Ⓐ
❺ shield case
RP-20 board

Fig. 1-2. Removal of the RP-20 Board

1-3. REMOVAL OF THE TA-22 BOARD

1) Remove the two screws (BVTP3 x 8) ❶ .
2) Remove the TA-22 board ❷ in the direction shown by the arrow.

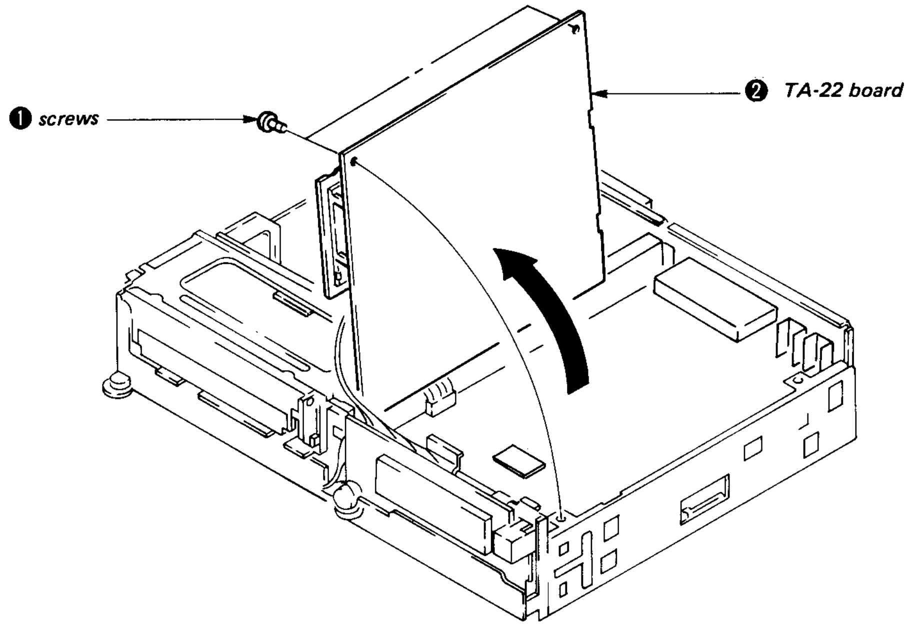

❶ screws
❷ TA-22 board

Fig. 1-3. Removal of the TA-22 Board

1-4. REMOVAL OF THE YC-31 BOARD

1) Stand the set with the left side panel on the bottom.
2) Remove the screw (BVTP3 x 8) ❶ .
3) Remove the plate, connector ❷ in the direction shown by the arrow Ⓐ .
4) Remove the two screws (BVTP3 x 8) ❸ .
5) Remove the YC-31 board ❹ in the direction shown by the arrow Ⓑ .

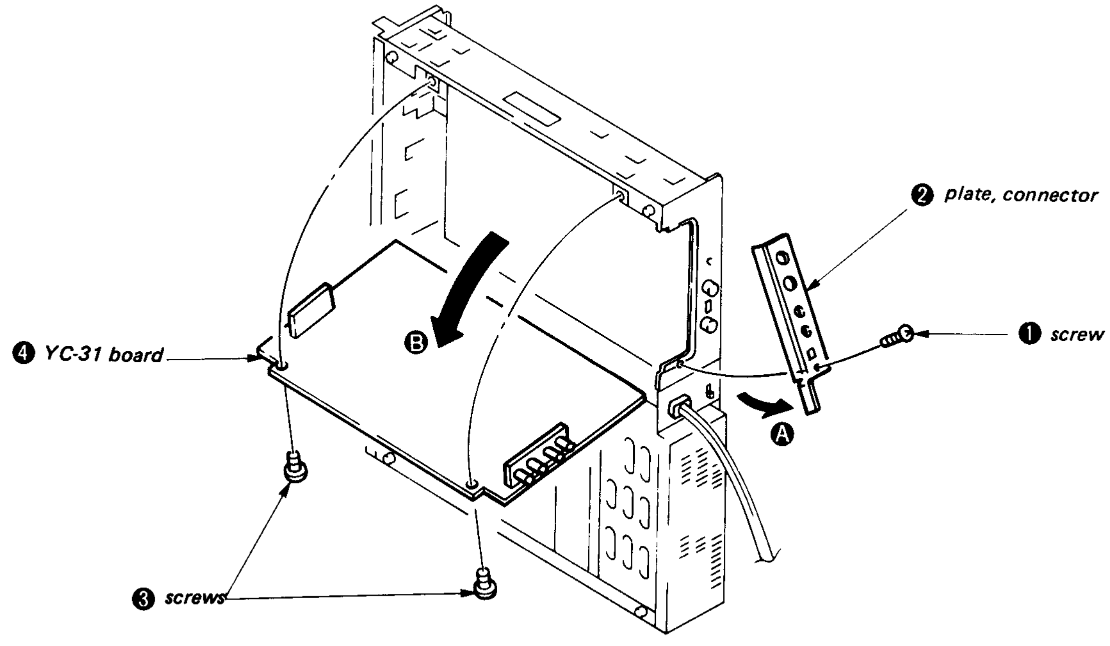

❷ plate, connector
❶ screw
❹ YC-31 board
Ⓑ
Ⓐ
❸ screws

Fig. 1-4. Removal of the YC-31 Board

1-5. REMOVAL OF THE POWER BLOCK

1) Remove the six screws (BVTP3 x 8) ❶ .
2) Pull out the five connectors (CN101, CN102, CN103, CN104, CN106) ❷ .
3) Remove the power block ❸ in the direction shown by the arrow.

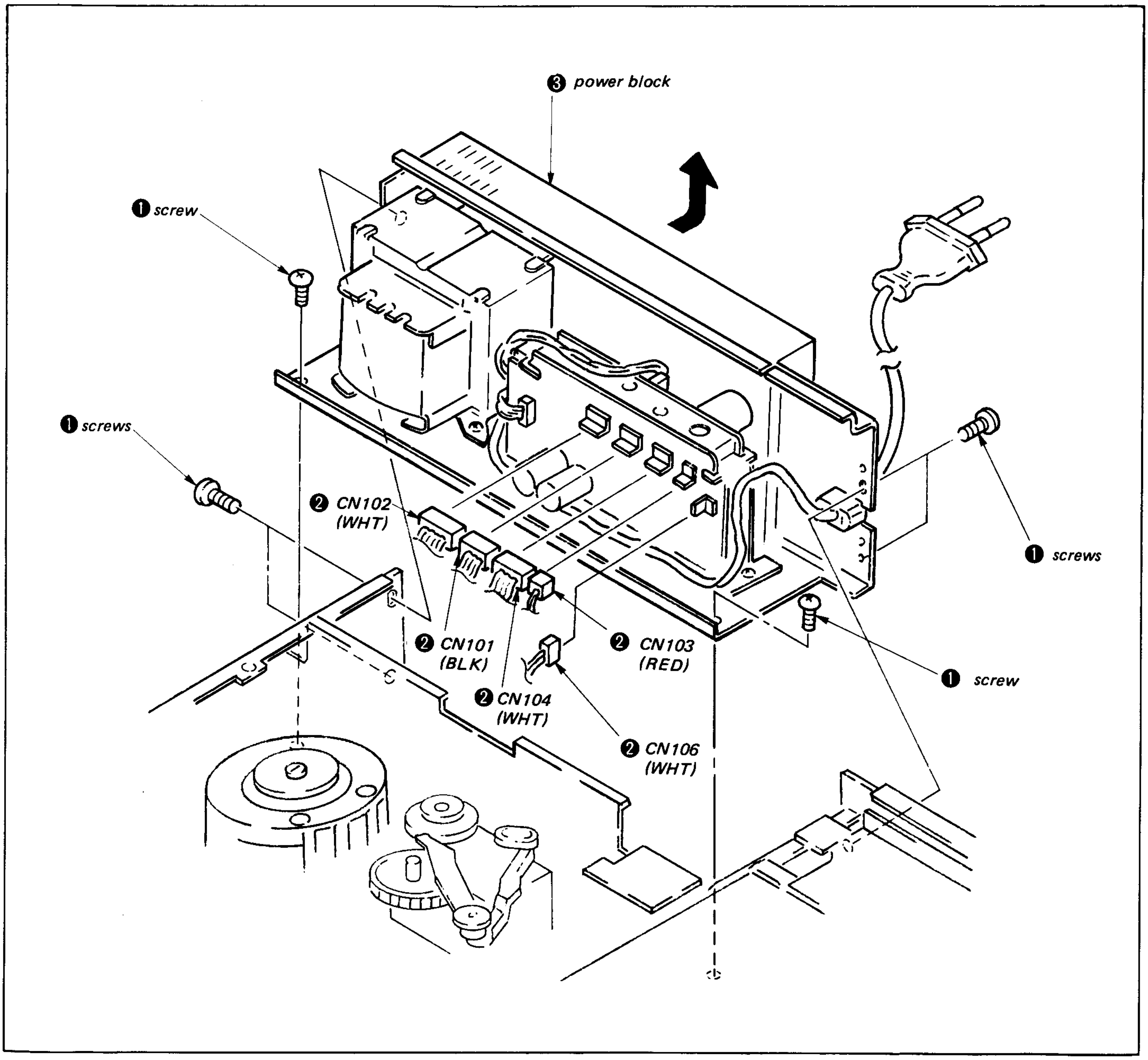

❸ power block
❶ screw
❶ screws
❷ CN102 (WHT)
❶ screws
❷ CN101 (BLK)
❷ CN103 (RED)
❶ screw
❷ CN104 (WHT)
❷ CN106 (WHT)

Fig. 1-5. Removal of the Power Block

1-6. OPERATION OF THE UNIT WITH THE FL CASSETTE COMPARTMENT REMOVED

1-6-1. How to Put the Unit into Threading Completed Mode when the FL Cassette Compartment is Removed

1) Connect ordinary screwdriver to short the leaf switch (cassette-on switch).

   Note:

   Be careful that the ordinary screwdriver do not touch any other parts (use tape or other insulation).

2) Press the cassette-down switch and leave it pressed in. When the power button is turned ON, threading starts.

※ Refer to 3-6 for instructions on how to remove the FL cassette compartment.

[How to EJECT in this condition]

- Press the EJECT button. When unthreading is completed and the internal gear starts to turn, turn the power OFF.

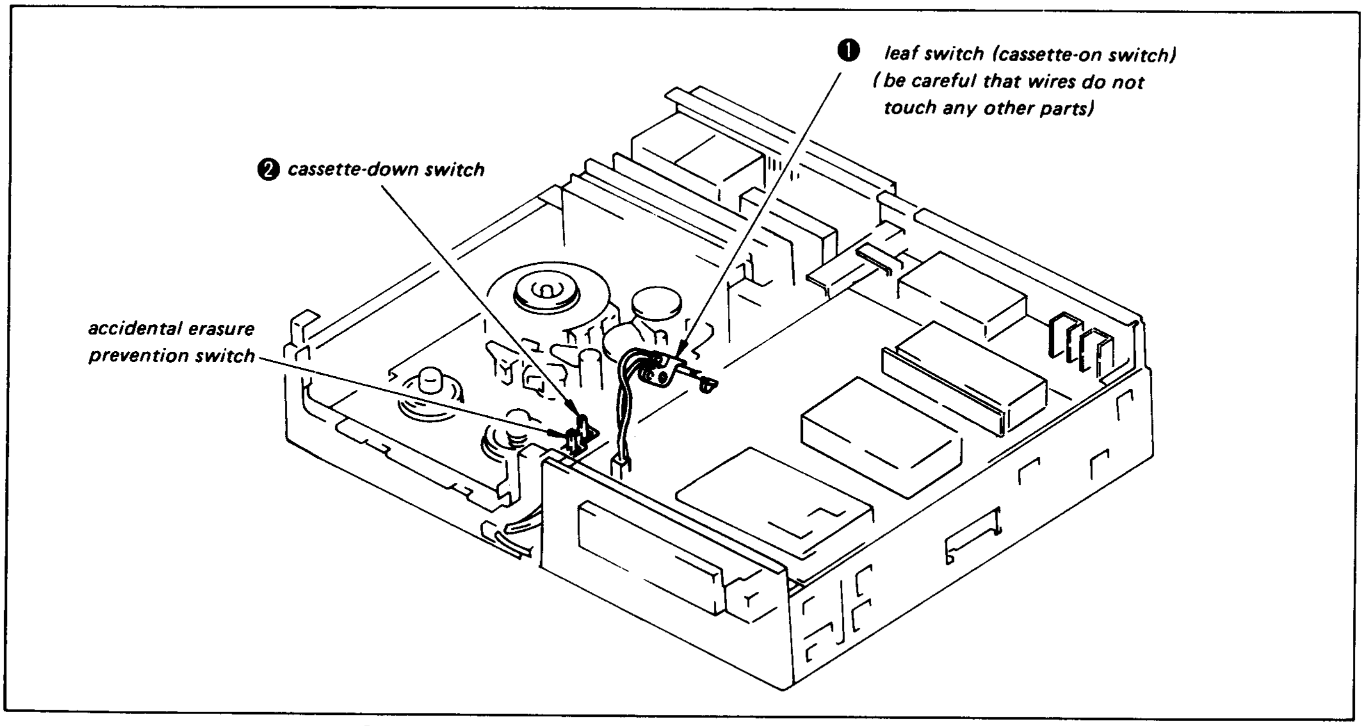

❶ leaf switch (cassette-on switch) (be careful that wires do not touch any other parts)
❷ cassette-down switch
accidental erasure prevention switch

Fig. 1-6. How to thread the tape when the FL cassette compartment has been removed

1-6-2. Playback Without Cassette Installed

Complete threading by the procedure described in 1-6-1, then press the playback button.

1-6-3. How to Put in Recording Mode Without Cassette Installed

1. Thread by the procedure in 1-6-1 then ress the accidental erasure prevention switch shown in Fig. 1-7.
2. With the accidental erasure prevention switch pressed down, press the recording button.

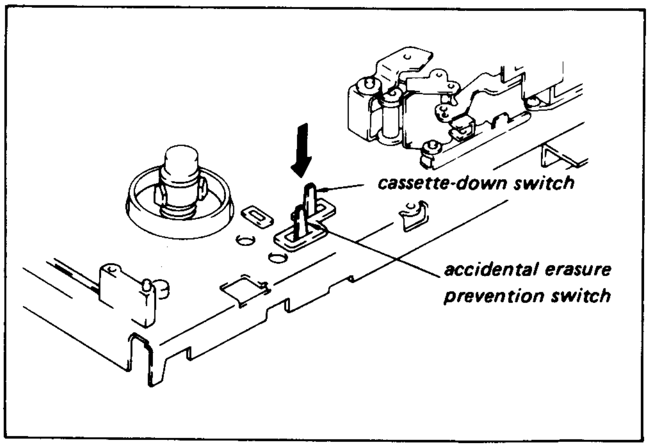

cassette-down switch
accidental erasure prevention switch

Fig. 1-7. How to put the recorder in recording mode with the FL cassette compartment removed

1-7. HOW TO LOAD, THREAD, UNLOAD AND UNTHREAD WITH THE POWER OFF

1-7-1. Manual Loading and Unloading

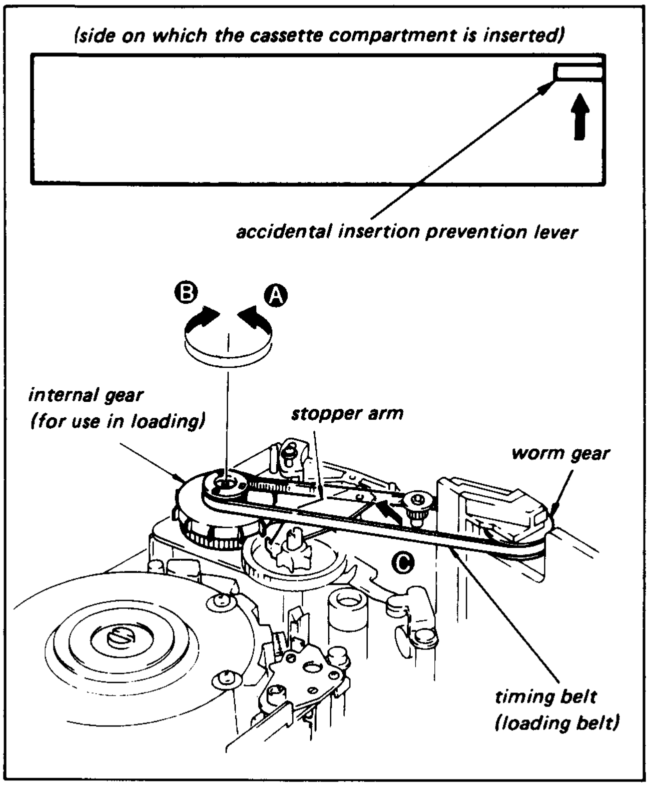

(side on which the cassette compartment is inserted)
accidental insertion prevention lever
Ⓑ
Ⓐ
internal gear (for use in loading)
stopper arm
worm gear
Ⓒ
timing belt (loading belt)

Fig. 1-8. Manual loading and unloading

1) Release the right accidental insertion prevention lever inside the cassette compartment, then press the stopper arm in the direction of arrow Ⓒ and release the internal gear stop.
2) Turn the internal gear manually in the direction of arrow Ⓐ until loading is completed.
3) To unload, turn the internal gear in the direction of arrow Ⓑ.

Note:
When the loading belt has been removed, load and unload by turning the worm gear manually.

1-7-2. Manual Threading and Unthreading

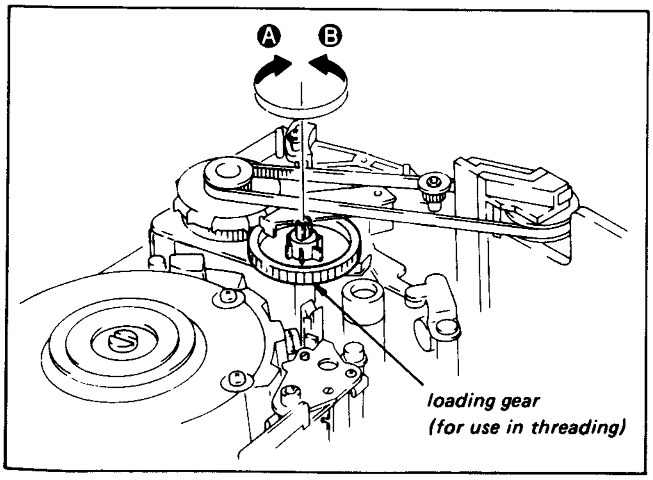

Ⓐ
Ⓑ
loading gear (for use in threading)

Fig. 1-9. Manual threading and unthreading

1) Turn the loading gear in the direction of arrow Ⓐ until loading is completed.
2) To unthread, turn the loading gear in the direction of arrow Ⓑ.

Note:
Always turn the loading gear sideways by hand. Never use a screwdriver or other tool.

1-8. TOOLS AND FIXTURES REQUIRED FOR SERVICING

Ref.No.	Name	Part Code	Carved Jig No.	Use and Remarks
J-1	Torque Measurement Tape	J-6080-003-C	SL-0003C	forward torque and back tension measurement
J-2	Parallel Plate	J-6086-570-A	SL-0657	audio/CTL head lateral adjustment capstan shaft vertical adjustment
J-3	Dental Mirror (handle) Dental Mirror (mirror)	J-6080-029-A J 6080 030 1	SL-5052	tape path and tape traveling adjustment check
J-4	Alignment Tape (KR5-2H)	8-969-995-52	——	tracking, overall adjustment of picture quality, etc.
J-5	Cleaning Fluid	Y-2031-001-0	——	
J-6	Thickness Gauge	9-911-053-00		
J-7	Chamois Cloth	2-034-697-00	——	cleaning
J-8	Head Demagnetizer	widely available	——	demagnetization of video head and audio head
J-9	Cleaning Cassette Tape	8-888-004-00	——	video head cleaning
J-10	Dihedral Adjustment Screw	J-6080-013-A	SL-0013	video dihedral adjustment

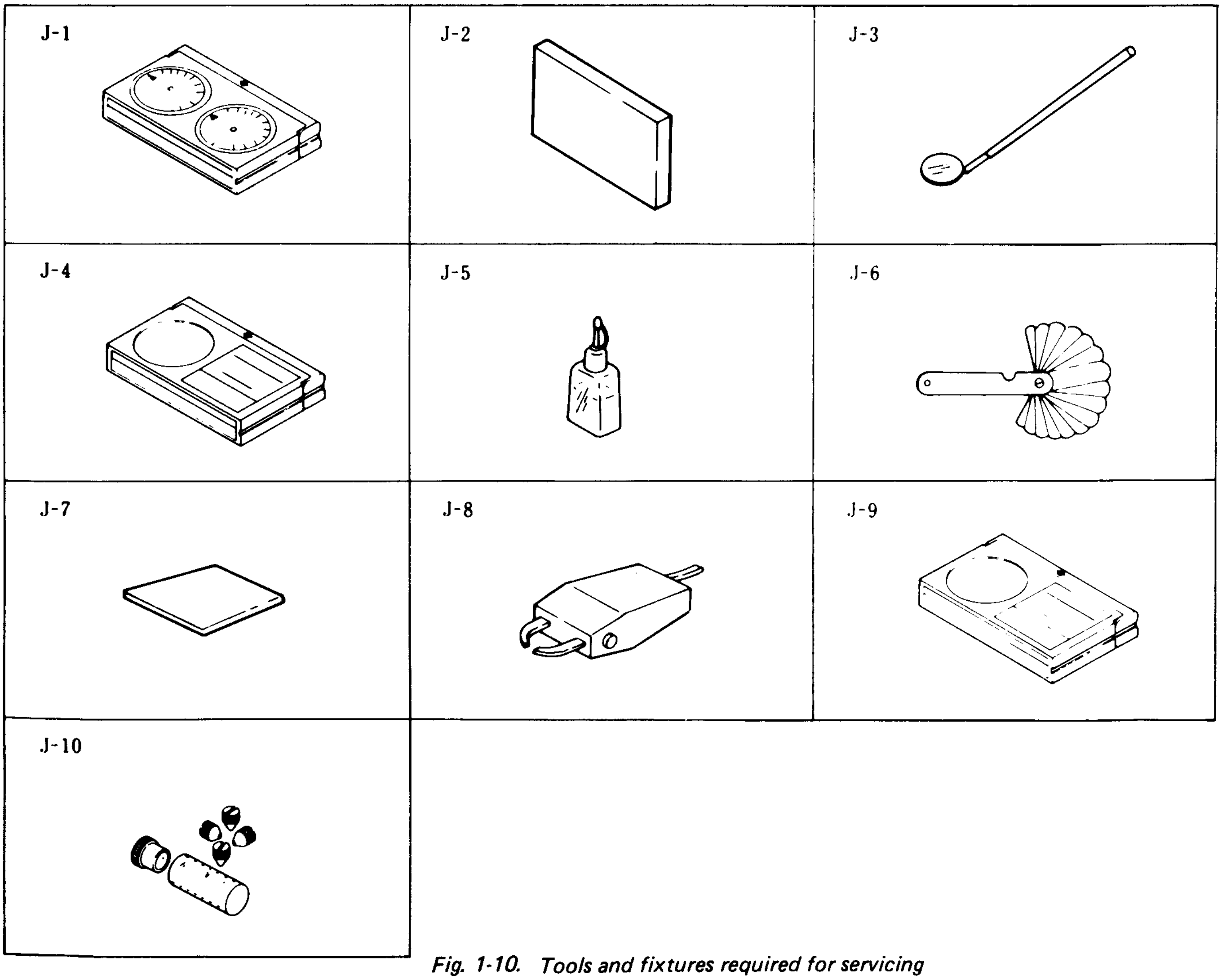


Fig. 1-10. Tools and fixtures required for servicing

2. PERIODIC CHECK AND MAINTENANCE

In order to obtain the best performance from this unit and make full use of its capabilities, and to extend the life of the unit and tapes, it is recommended that the following periodic checks and maintenance be performed.

2-1. POST-REPAIR MAINTENANCE

The following must be done after every repair regardless of how many hours the user has operated the machine.

2-1-1. Cleaning of Rotating Head Disk Assembly

1) Press a chamois cloth (Jig Ref. No. J-7) which has been dipped in cleaning fluid (Jig Ref. No. J-5) lightly against the rotating drum assembly, then do the cleaning by slowly rotating the rotating head disk by hand. (Never try to clean by using the motor to turn it.)
2) Never try to clean by moving the chamois cloth at a right angle to the head tip. There is a very great danger of damaging the head tip if this is done.

2-1-2. Cleaning of the Tape Movement System

1) Clean the surfaces which the tape contacts during its movement (tape guide, drum assembly surface, capstan, pinch roller, etc.) with a chamois cloth that has been dipped in in cleaning fluid.

2-1-3. Cleaning the Drive System

1) Clean the driving parts with a cloth that has been dipped in cleaning fluid.

parts requiring cleaning

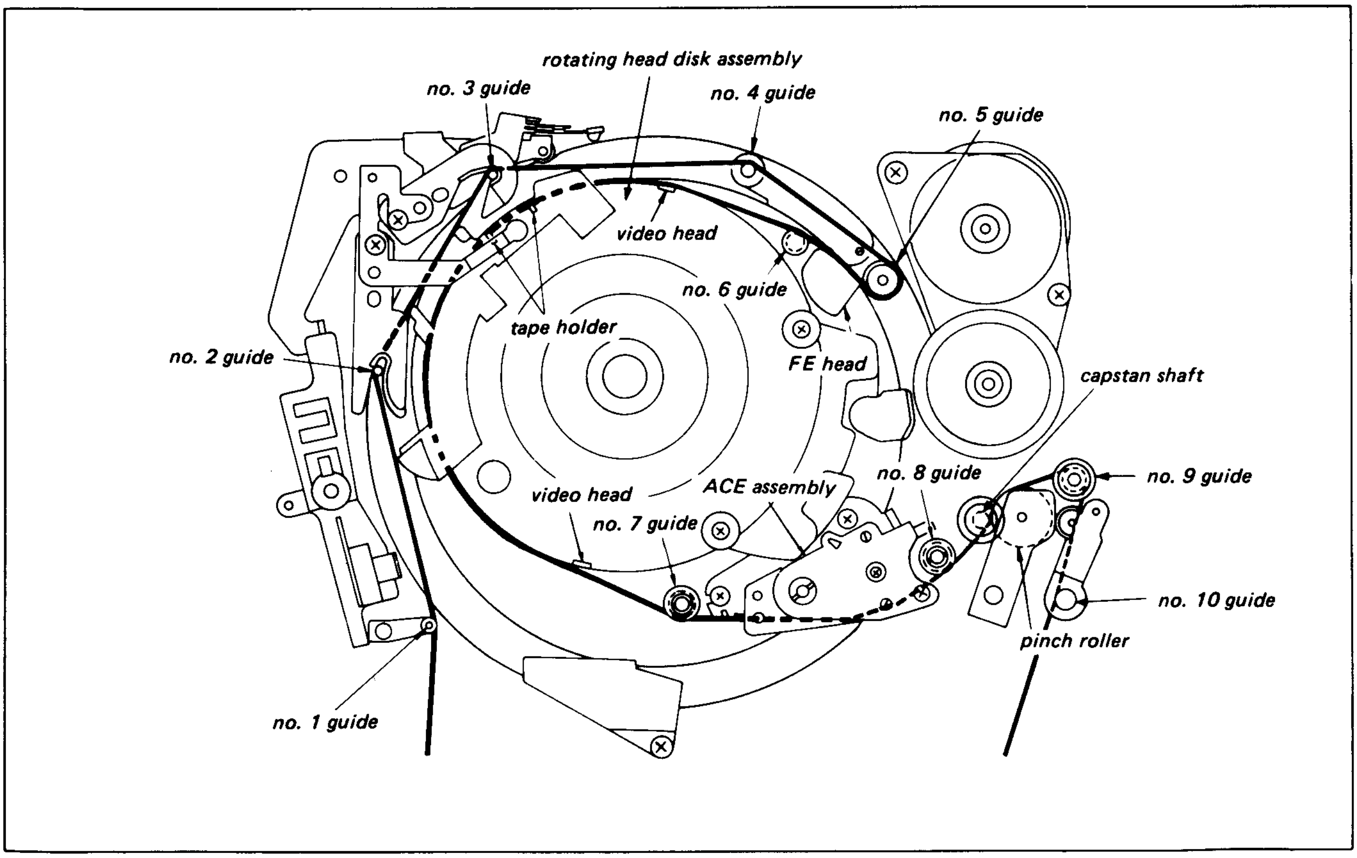

rotating head disk assembly
no. 3 guide
no. 4 guide
no. 5 guide
video head
no. 6 guide
tape holder
FE head
no. 2 guide
capstan shaft
no. 8 guide
no. 9 guide
video head
ACE assembly
no. 7 guide
no. 10 guide
pinch roller
no. 1 guide

Fig. 2-1. Parts requiring cleaning

2-2. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below. accoring to user's operating hours.

Maintenance & Check		Replacement Part No.	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Trans-Portation System	Cleaning of tape trans-portation system	——	○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning and degaussing of ACE ass'y	——	○	○	○	○	○	○	○	○	○	○	
	Cleaning & degaussing of video disk ass'y	——	○	○	○	○	○	○	○	○	○	○	The life of the head varies, depending on operational conditions and method.
Driving System	Loading belt (synchro belt)	3-684-264-01	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	This cleaning must be done whenever a repair is made.
	Cleaning of iron core and opening of solenoid	——	–	–	–	○	–	–	–	○	–	–	Wipe iron core and opening of solenoid with dry cloth.
Performance Confirmation	Abnormal sound		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which causes abnormal sound.
	Measurement of FWD back tension		–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to 3-13. Specified value: adjust to 31 – 35 g·cm (When measured with torque cassette tape)
	Confirmation of brake system		–	☆	–	☆	–	☆	–	☆	–	☆	
	Confirmation of record & playback functions		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.
	Measurement of forward torque		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust to 80 ± 5 g·cm (SL-0003C)

○ Cleaning ★ Replacement ☆ Confirmation

Note:
On overhaul
When overhauling the unit, replace parts as indicated in the above table.

3. CHECK, ADJUSTMENT AND REPLACEMENT PROCEDURES

3-1. REPLACEMENT OF ROTATING HEAD DISK ASSEMBLY

3-1-1. Removal of the Rotating Head Disk Assembly (Fig. 3-1)

1) Remove the two screws that hold the damper assembly in place, then remove the damper assembly.
2) Use a hexagonal wrench to remove the hexagonal socket bolt that holds the upper drum assembly in place, then remove the upper drum assembly.

   Note:

   Turn the upper drum to remove, being careful not to move the adjusting plate. Movement of the adjusting plate will have a great effect on the tape path, so caution is required.
3) Unsolder the rotating head disk relay plate (4 red and white leads).
4) Remove the two hexagonal socket bolts holding rotating head disk assembly ❺ in place, then remove the rotating head disk assembly.

   Note:

   Be careful not to touch the head tip with the hand or bang anything against it.

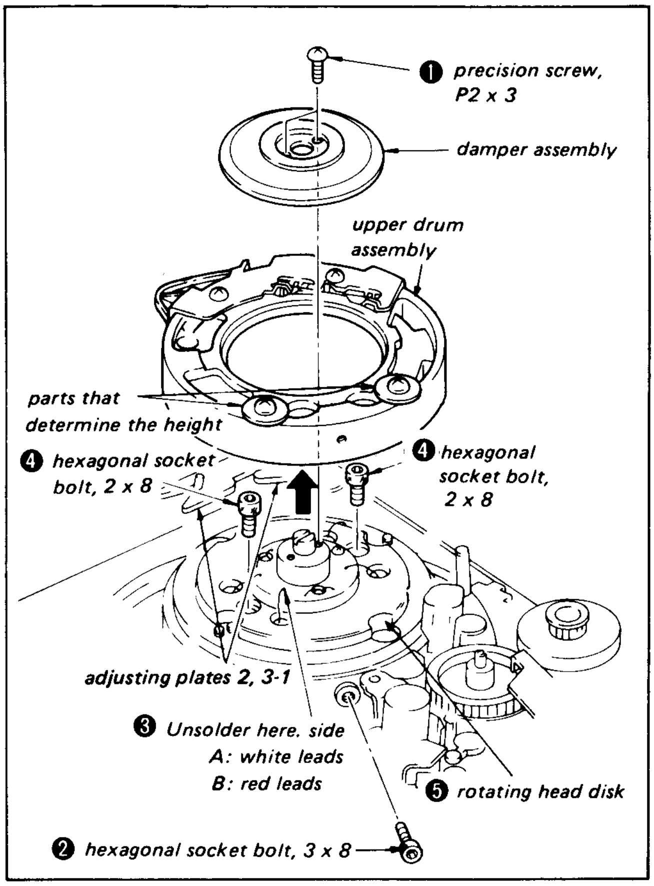

❶ precision screw, P2 x 3
damper assembly
upper drum assembly
parts that determine the height
❹ hexagonal socket bolt, 2 x 8
❹ hexagonal socket bolt, 2 x 8
adjusting plates 2, 3-1
❸ Unsolder here, side A: white leads B: red leads
❺ rotating head disk
❷ hexagonal socket bolt, 3 x 8

Fig. 3-1. Removal of the rotating head disk assembly I

3-1-2. Mounting of the Rotating Head Disk Assembly (Fig. 3-1)

1) Insert rotating head disk ❺ in place, being careful of the direction so that the red and white leads are in the right places.
2) Tighten hexagonal socket bolt ❹ and solder the lead wires.

Note:

Be careful to solder the lead wires correctly and not to break any wires.

3) Attach the upper drum, being careful (as during removal) not to move the adjusting plate. While pressing the two points that determine the height, tighten hexagonal socket bolt ❷.

   Note:

   When inserting the upper drum, be careful that it does not touch the head tip.

Note:

When replacing the rotating drum head, it can happen that the rotating head disk assembly will be hard to remove. In such a case, remove it using the method explained below (Fig. 3-2).

1) Remove the hexagonal socket bolts that hold the rotating head disk assembly in place.
2) When the head disk is jammed on tight and is hard to remove, screw the hexagonal socket bolts removed in step ❶ into the threaded holes removed from the original holes by 90°. Tighten them a little at a time.

The head disk will be lifted up by the two screws and will come off easily.

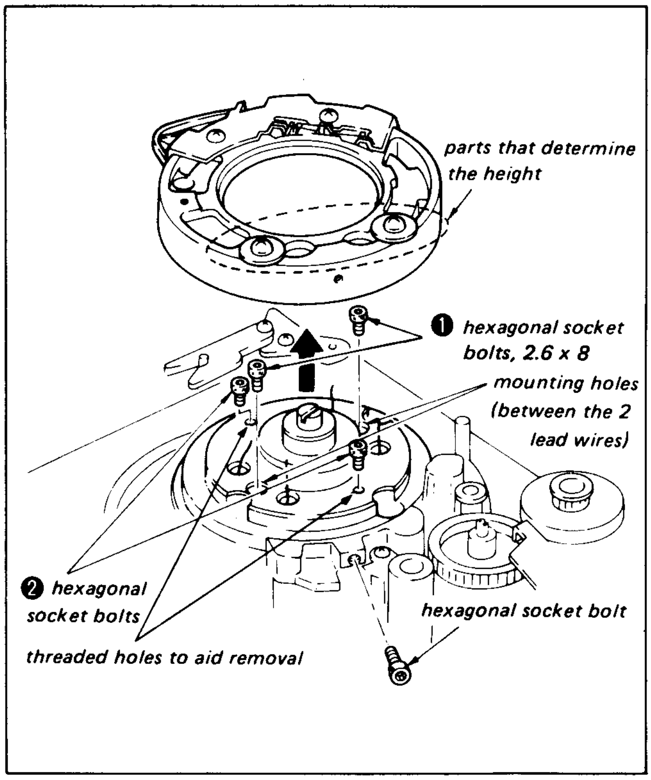

parts that determine the height
❶ hexagonal socket bolts, 2.6 x 8
mounting holes (between the 2 lead wires)
❷ hexagonal socket bolts
threaded holes to aid removal
hexagonal socket bolt

Fig. 3-2. Removal of the rotating head disk assembly II

3-2. VIDEO HEAD DIHEDRAL CHECK AND ADJUSTMENT

This adjustment is generally unnecessary, but it is sometimes necessary when the video head disk is replaced. (The video head disk used for maintenance has been precision adjusted at the factory using a microscope and almost never needs to be readjusted.)

When judging whether the video head dihedral angle is correct, the alignment tape is played back. When this is done the tracking control knob must be in the centering position. If the check is done with this knob in other than the center click position (if the tracking is off-center), even if the dihedral angle is correct the picture will be reproduced as if it were off.

Before this adjustment is performed, the ACE assembly position adjustment (refer to the section where the tape path adjustment is described) must be completed.

[Method of checking]

With the tracking control knob set to the center click position, play back the monoscope section of the alignment tape. Check to see if any of the vertical monoscope lines immediately below the switching pulse are reproduced double. If not, the dihedral angle is correct and does not have to be adjustment. If so, perform the adjustment as explained below.

[Method of adjustment]

1) As shown in Fig. 3-3, screw two dihedral angle adjustment screws (Jig Ref. No. J-10) into the adjustment screw holes on the side on which the red lead wires from the video head are connected, until the top of the screw is level with the video head disk. (If they are not screwed in far enough, the video head disk will not turn past the point where the top of the adjustment screw strikes the upper drum. Conversely, if it is screwed in too far, the head base will be moved, throwing the video head dihedral angle way off.)

   Note:
   The side on which the white lead wires are connected is the reference side and must not be moved.
2) Screw one of the two adjustment screws in a little bit farther until resistance is felt. Beyond this point, turning the screw still farther will move the video head, adjusting the dihedral angle.
3) With the adjustment screws in place, play the monoscope signal section of the alignment tape and see how the lines are reproduced. If the vertical lines are split apart more than before, turn the screw which was screwed in more tightly counterclockwise to loosen it, then adjust by tightening the other screw.
4) After the adjustment is completed, remove the adjustment screws and play the tape again to reconfirm that the adjustment is correct.

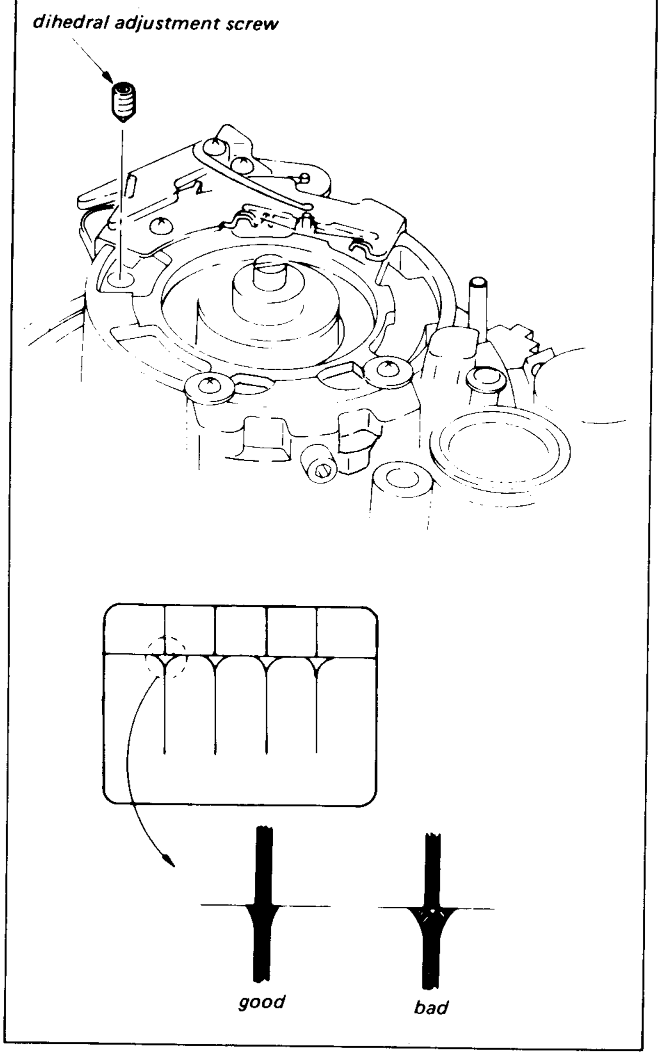


Fig. 3-3. Video head dihedral adjustment

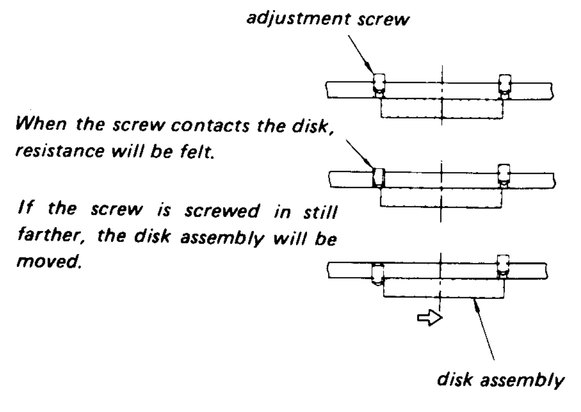

adjustment screw
When the screw contacts the disk, resistance will be felt.
If the screw is screwed in still farther, the disk assembly will be moved.
disk assembly

Fig. 3-4.

3-3. REPLACEMENT AND ADJUSTMENT OF THE DRUM ASSEMBLY

3-3-1. Replacement of the Drum Assembly

1) Measure gap Ⓐ between adjusting plate 2 and the upperdrum holder section and record the measurement.
   Note:
   The position where the adjusting plate is mounted has a large effect on the tape path, so this measurement must be performed.
2) Measure gap Ⓑ between adjusting plate 3-1 and the upper drum holder section, and record the measurement.
   Note:
   The position where the adjusting plate is mounted has a large effect on the tape path, so this measurement must be performed.
3) Remove the screws shown in Fig. 3-5, then remove the tape guide ground plate and adjusting plates 2 and 3-1.
4) Remove the 3 connectors from the rear of the chassis as shown in Fig. 3-6.
5) Remove the 3 drum mounting screws from the rear of the chassis, then remove the main body of the drum assembly. After the replacement has been completed, adjust the drum path.

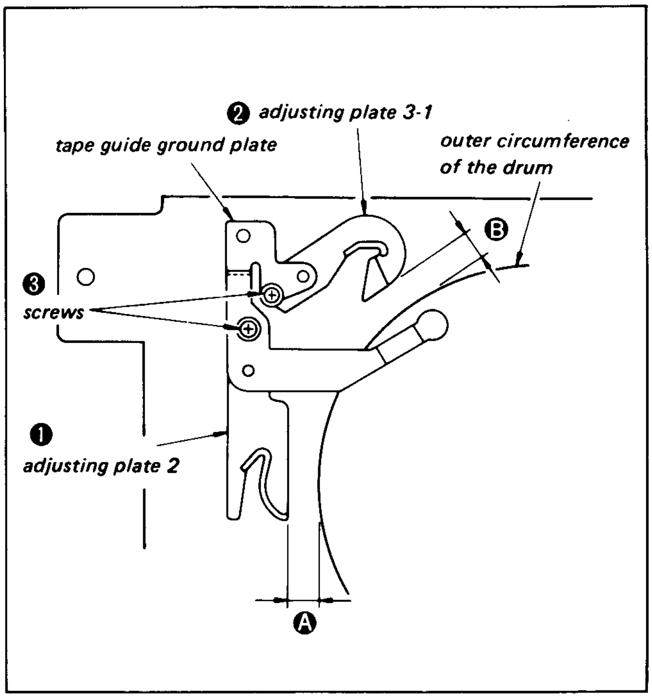

❷ adjusting plate 3-1
tape guide ground plate
outer circumference of the drum
Ⓑ
❸
screws
❶
adjusting plate 2
Ⓐ

Fig. 3-5. Measurement of the position of adjusting plates 2 and 3-1

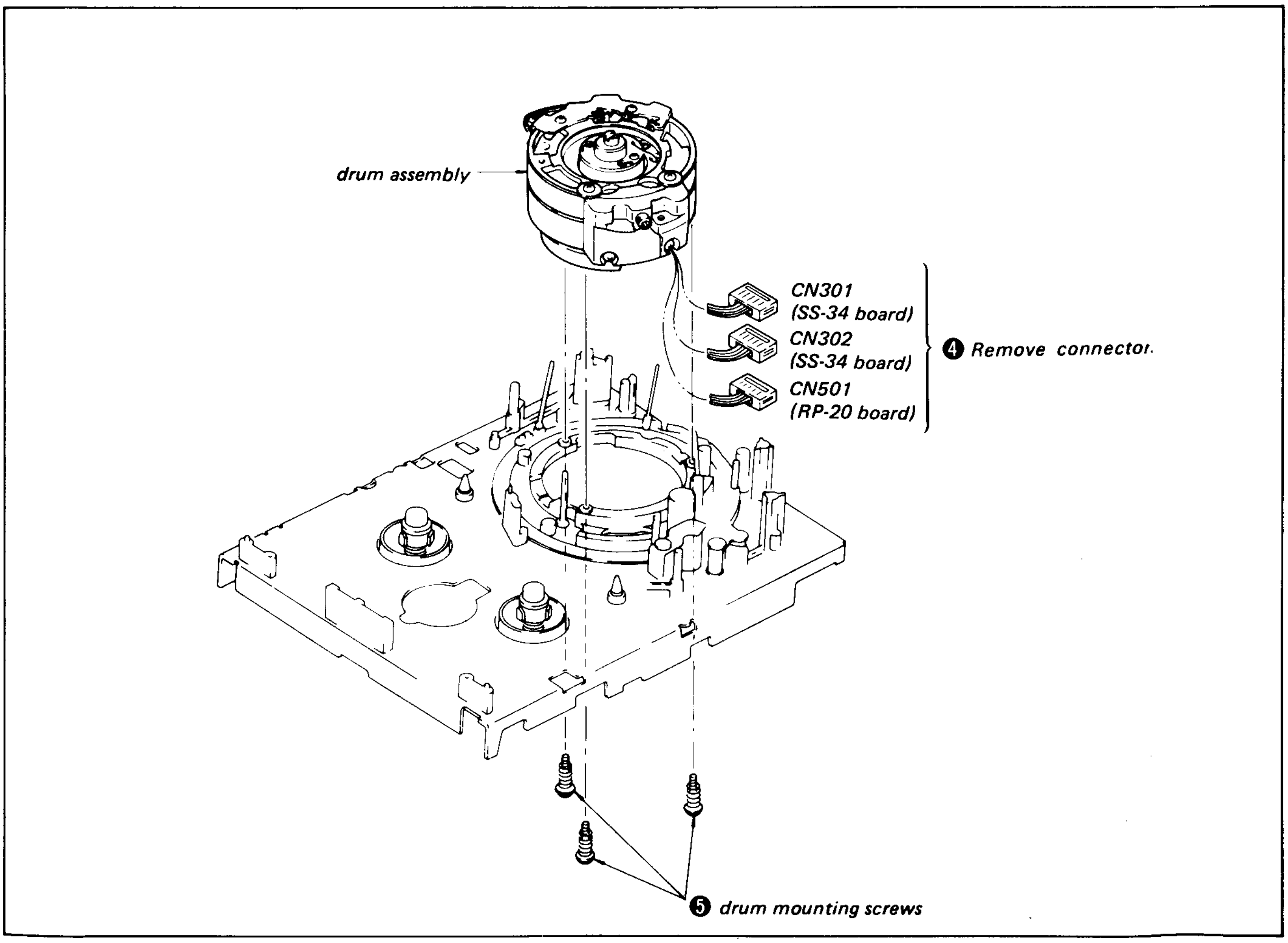

drum assembly
CN301
(SS-34 board)
CN302
(SS-34 board)
CN501
(RP-20 board)
❹ Remove connector
❺ drum mounting screws

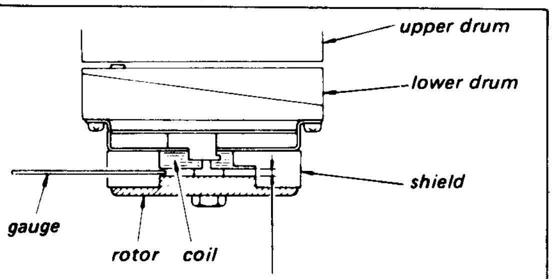
Fig. 3-6. Removal of the drum assembly

3-3-2. Adjustment of the Motor Gap when Replacing the Drum Assembly

After replacing the drum assembly, adjust the gap between the motor rotor and the coil to 0.3 mm to 0.6 mm (Fig. 3-7).

[Procedure]

1) When re-assembling the drum, use the spacers which were removed to produce a gap of between 0.3 mm and 0.6 mm. Measure the gap using the gauge that comes with the drum for assembly and maintenance use. One side of the gauge is 0.3 mm and the other side is 0.6 mm. If the gap is adjusted correctly, the 0.3 mm side should fit in and the 0.6 mm side should not.
2) If this fails to give the correct gap width, do not use the spacers which were removed; instead, use a combination of the 4 0.3 mm accessory spacers to obtain the correct width.

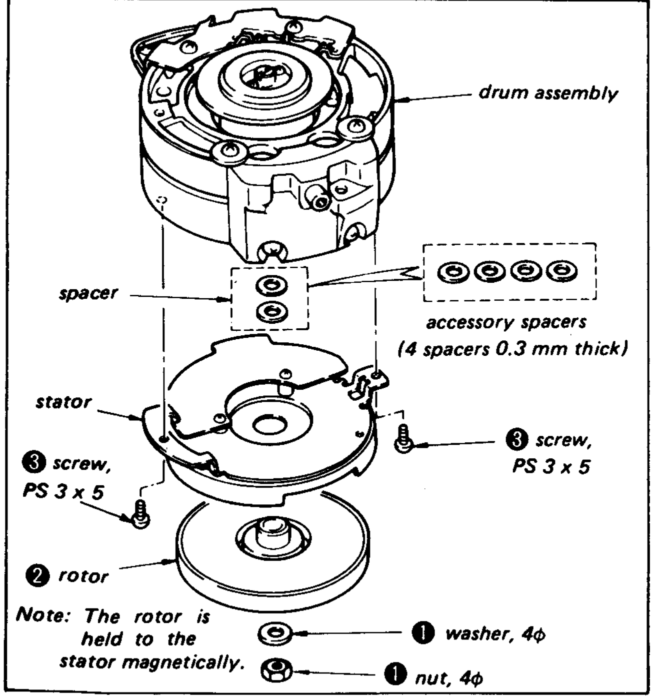

upper drum
lower drum
shield
gauge
rotor
coil

Try to insert the gauge into the gap between the rotor and the coil. The gap width should be between 0.3 mm and 0.6 mm.

Fig. 3-7. Checking the motor gap width after replacing the drum assembly

Removal of the stator and rotor when replacing the drum

1) Remove the nut and washer.
2) Remove the rotor from the stator.
3) Remove the 2 screws, then remove the stator from the main body of the drum.


drum assembly
spacer
accessory spacers
(4 spacers 0.3 mm thick)
stator
❸ screw, PS 3 x 5
❸ screw, PS 3 x 5
❷ rotor
❶ washer, 4ϕ
❶ nut, 4ϕ

Note: The rotor is held to the stator magnetically.

Fig. 3-8. Removal of the stator and rotor when replacing the drum

3-4. REPLACEMENT OF THE CAPSTAN MOTOR

3-4-1. Removal of the Capstan Motor (Fig. 3-9)

- Remove the three screws ❶ then remove the capstan motor from the rear of the mechanical chassis.

  Note:

  When the capstan motor has been removed or replaced, check the tape path once.

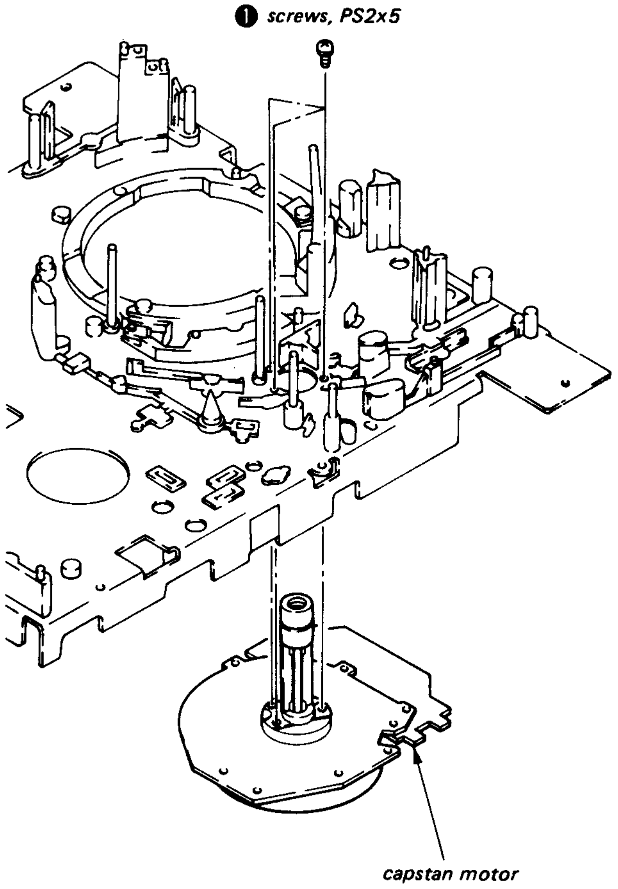

❶ screws, PS2x5
capstan motor

Fig. 3-9 Removal of the capstan motor

3-5. REMOVAL OF THE S COIL SENSOR (Fig. 3-10)

1) Remove the spring.
2) Remove the claw in the direction of arrow Ⓐ ,then pull the S coil sensor out.
3) Pull out the connector from CN604 on SS-34 board.

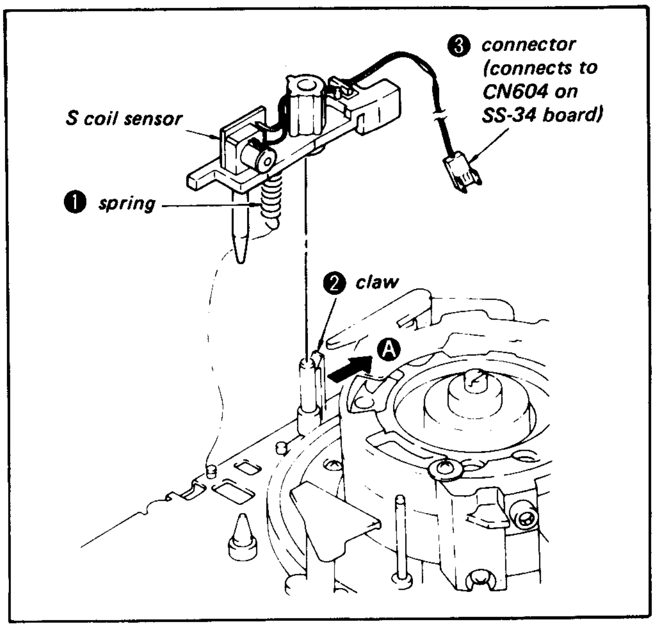

❸ connector (connects to CN604 on SS-34 board)
S coil sensor
❶ spring
❷ claw
Ⓐ

Fig. 3-10. Removal of the S coil sensor

3-6. REMOVAL OF THE FL CASSETTE COMPARTMENT ASSEMBLY (Fig. 3-11)

1) Remove the four screws (BVTP3 x 8) ❶ .
2) Remove the internal gear flange ❷ .
3) Remove the timing belt (loading belt) ❸ .
4) Pull out the connector CN606 ❹ , on the SS-34 board.
5) Remove the FL cassette compartment assembly ❺ in the direction shown by the arrow.

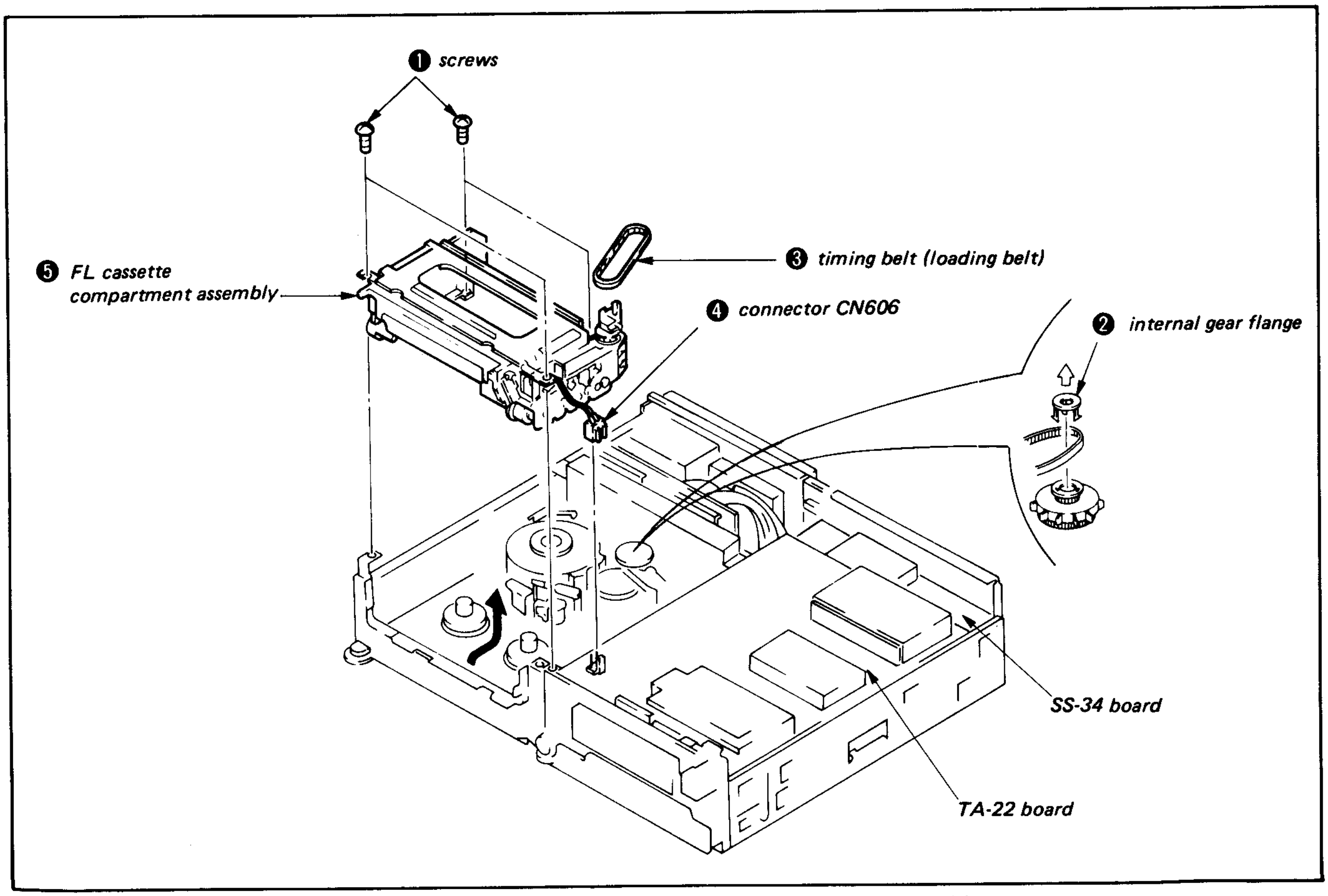

❶ screws
❺ FL cassette compartment assembly
❸ timing belt (loading belt)
❹ connector CN606
❷ internal gear flange
SS-34 board
TA-22 board

Fig. 3-11. Removal of the FL cassette compartment assembly

3-7. ADJUSTMENT OF THE FL CASSETTE COMPARTMENT

3-7-1. Adjustment of the Position of the Right Gear of the FL Cassette Compartment Assembly

In the FL cassette compartment assembly, the cassette holder must always move parallel to the mechanical chassis. The gear system is used to control the amount by which the cassette holder advances so that this will be the case. Consequently, if the gears in this section slip out of mesh, the next time the unit is assembled the gear mesh must be adjusted to the correct position; otherwise the cassette will not feed properly.

[Adjustment of the gear positions]

1) Get a positioning rod about 200 mm long and 1.5 mm in diameter ready.
2) While passing the positioning rod through the combination of the drive arm right and cassette ON cam, fit the latter on the right side plate. Similarly, fit the drive arm left onto the left side plate.
3) Similarly, while passing the positioning rod through the worm wheel, fit the latter onto the right side plate.
4) Similarly, while passing the positioning rod through the combination of the limiter gear and cassette OFF cam, fit the latter onto the right side plate.

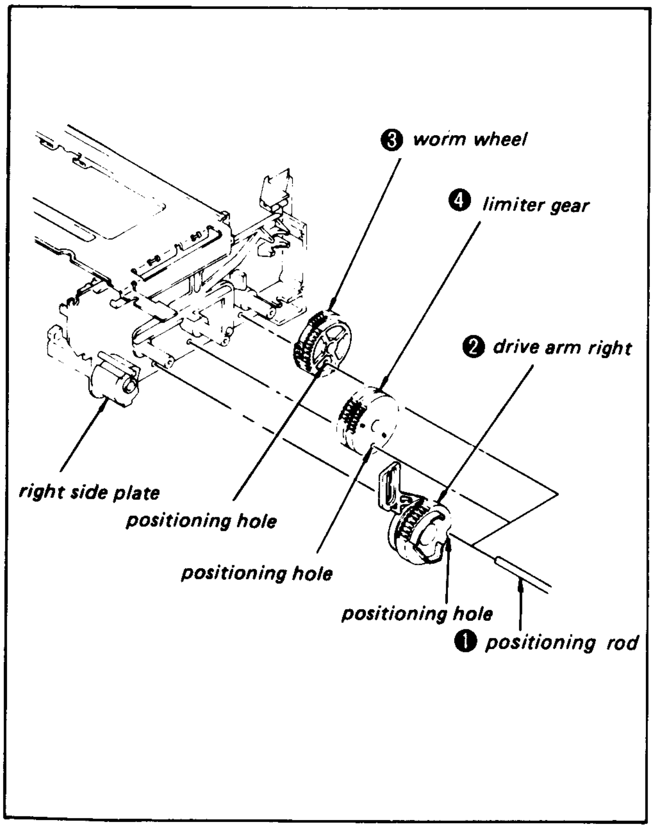

❸ worm wheel
❹ limiter gear
❷ drive arm right
right side plate
positioning hole
positioning hole
positioning hole
❶ positioning rod

Fig. 3-12. Positioning of the FL cassette compartment gears

3-7-2. Cassette ON Switch Operation Check and Adjustment

[Method of checking]

When inserting a cassette into the FL cassette compartment assembly, confirm that, as the cassette is inserted, the leafswitch comes ON when the center of the drive roller is 8 to 13 mm from the end of the guide groove, as shown in Fig. 3-13.

[Method of adjustment]

Bend the tip of the cassette ON switch in the direction of the arrow.

Adjust so that the cassette ON switch comes ON when the above distance is 8 to 13 mm, and finally tighten the screw.

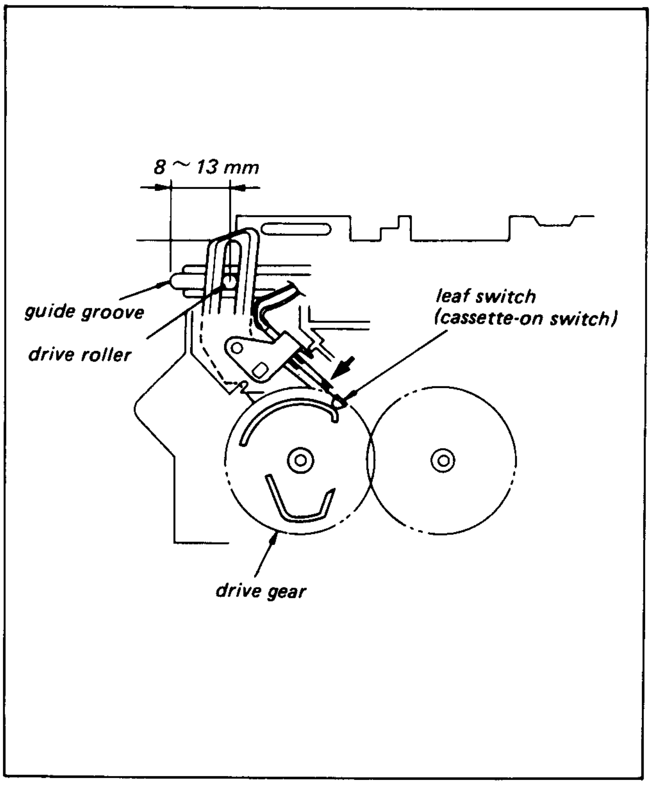

8 ~ 13 mm
guide groove
drive roller
leaf switch
(cassette-on switch)
drive gear

Fig. 3-13. Cassette ON switch operation check and adjustment

3-7-3. Checking and Adjustment of the Cassette Door Assembly

[Method of checking]

With the door opening and closing arm returned all the way in the direction of arrow Ⓐ , check to make sure that the door is vertical.

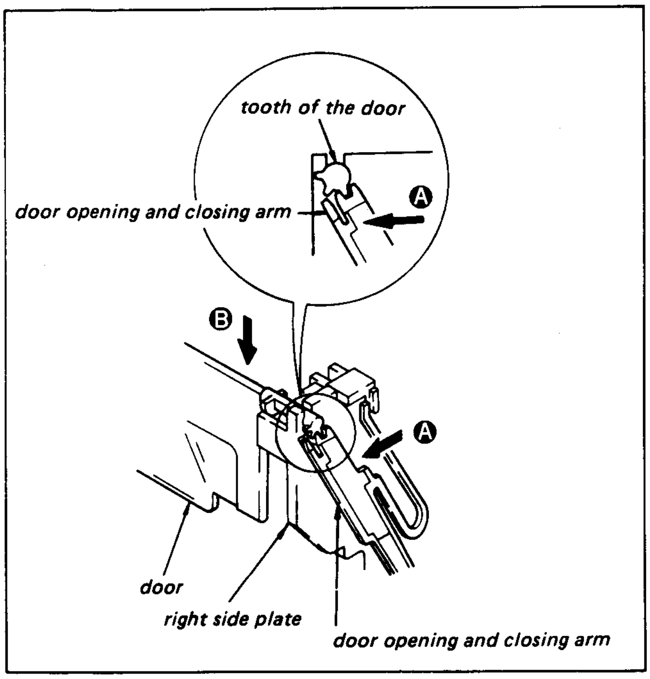

tooth of the door
door opening and closing arm
Ⓐ
Ⓑ
Ⓐ
door
right side plate
door opening and closing arm

Fig. 3-14. Adjustment of the position of the cassette door assembly

[Method of adjustment]

check to make sure that the door opening and closing rack plate has returned all the way. Then, close the door together in the drection of arrow Ⓑ so that it is vertical, and mesh the gears.

3-7-4. Mounting the FL Cassette Compartment Assembly (Fig. 3-15)

1) Hook the two holes of the FL cassette compartment assembly onto the mechanical chassis, then place the compartment in the specified position on the chassis.
2) Loosely tighten the 4 mounting screws of the FL cassette compartment assembly. Move the FL cassette compartment assembly forward and backward with respect to the mechanical chassis, set it in the correct position, then tighten the mounting screws all the way.
3) Connect the timing belt (loading belt) between the threading motor and the worm gear, then hold it in place with the internal gear flange.
4) Press the tension roller arm in the direction of the arrow to adjust the tension of the timing belt (loading belt), then fix it in place with the arm fixing screw.
5) Insert the harness sticking out from the FL cassette compartment into connector CN606 on SS-34 board.

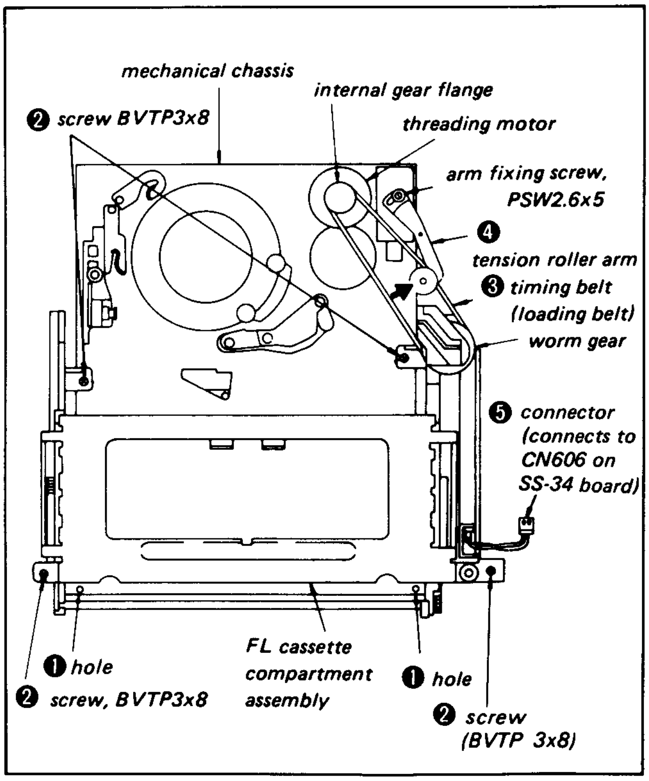
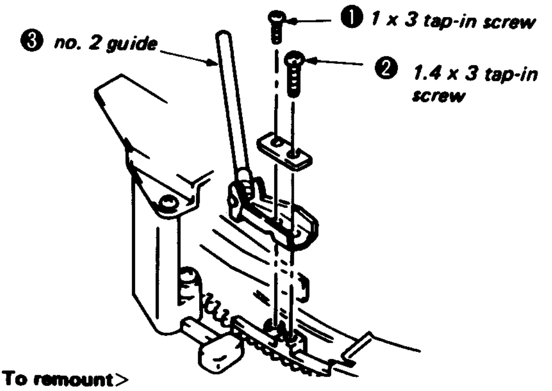

mechanical chassis
internal gear flange
❷ screw BVTP3x8
threading motor
arm fixing screw, PSW2.6x5
❹
tension roller arm
❸ timing belt (loading belt)
worm gear
❺ connector (connects to CN606 on SS-34 board)
❶ hole
❷ screw, BVTP3x8
FL cassette compartment assembly
❶ hole
❷ screw (BVTP 3x8)

Fig. 3-15. Mounting the FL cassette compartment assembly

3-8. REMOVAL OF THE No. 2 AND No. 3 GUIDES

3-8-1. Removal of the No. 2 Guide

1) Remove the 1×3 tap-in screw.
2) Remove the 1.4×3 tap-in screw.
3) Remove the No. 2 guide assembly.


❶ 1 x 3 tap-in screw
❸ no. 2 guide
❷ 1.4 x 3 tap-in screw

<To remount>

1) Loosely tighten the 1 x 3 tap-in screw.
2) Tighten the 1.4 x 3 tap-in screw all the way.
3) Adjust the 1 x 3 tap-in screw until the height is 35 mm. After adjustment, lock the screw.
Note: The no. 2 guide is up all the way.

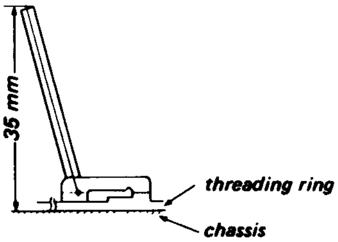
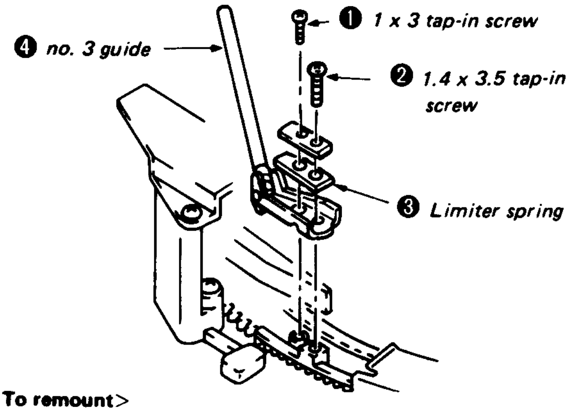

35 mm
threading ring
chassis

Fig. 3-16. Removal of the no. 2 guide

3-8-2. Removal of the No. 3 Guide

1) Remove the 1×3 tap-in screw.
2) Remove the 1.4×3.5 tap-in screw.
3) Remove the limiter spring.
4) Remove the No. 3 guide assembly.


❶ 1 x 3 tap-in screw
❹ no. 3 guide
❷ 1.4 x 3.5 tap-in screw
❸ Limiter spring

<To remount>

1) Loosely tighten the 1 x 3 tap-in screw.
2) Tighten the 1.4 x 3.5 tap-in screw all the way.
3) Adjust the 1 x 3 tap-in screw so that the height is 30 mm. After adjustment, lock the screw.
Note: The no. 3 guide is up all the way.

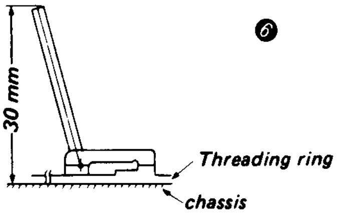

❻
30 mm
Threading ring
chassis

Fig. 3-17. Removal of the no. 3 guide

3-9. REPLACEMENT AND ADJUSTMENT OF THE S THREADING RING

3-9-1. Perparation to Remove the S Therading Ring Removal of the ACE Assembly, FE Head and Threading Motor (Fig. 3-18)

1) Remove the cross-recessed head screw.
2) Remove the No. 6 guide nut.
3) Remove the No. 6 washer.
4) Remove the No. 6 guide spacer.
5) Remove the compression coil spring.
6) Remove the 2 guide adjustment screws, then remove the ACE assembly and the FE head.

Note:
Since the ACE assembly and the FE head are connected by a lead wire, be careful when removing them. It is not necessary to remove the compression coil spring below the ACE assembly, but be careful not to use it.

7) Remove the 3 screws. then remove the threading motor assembly by pulling it up and out.

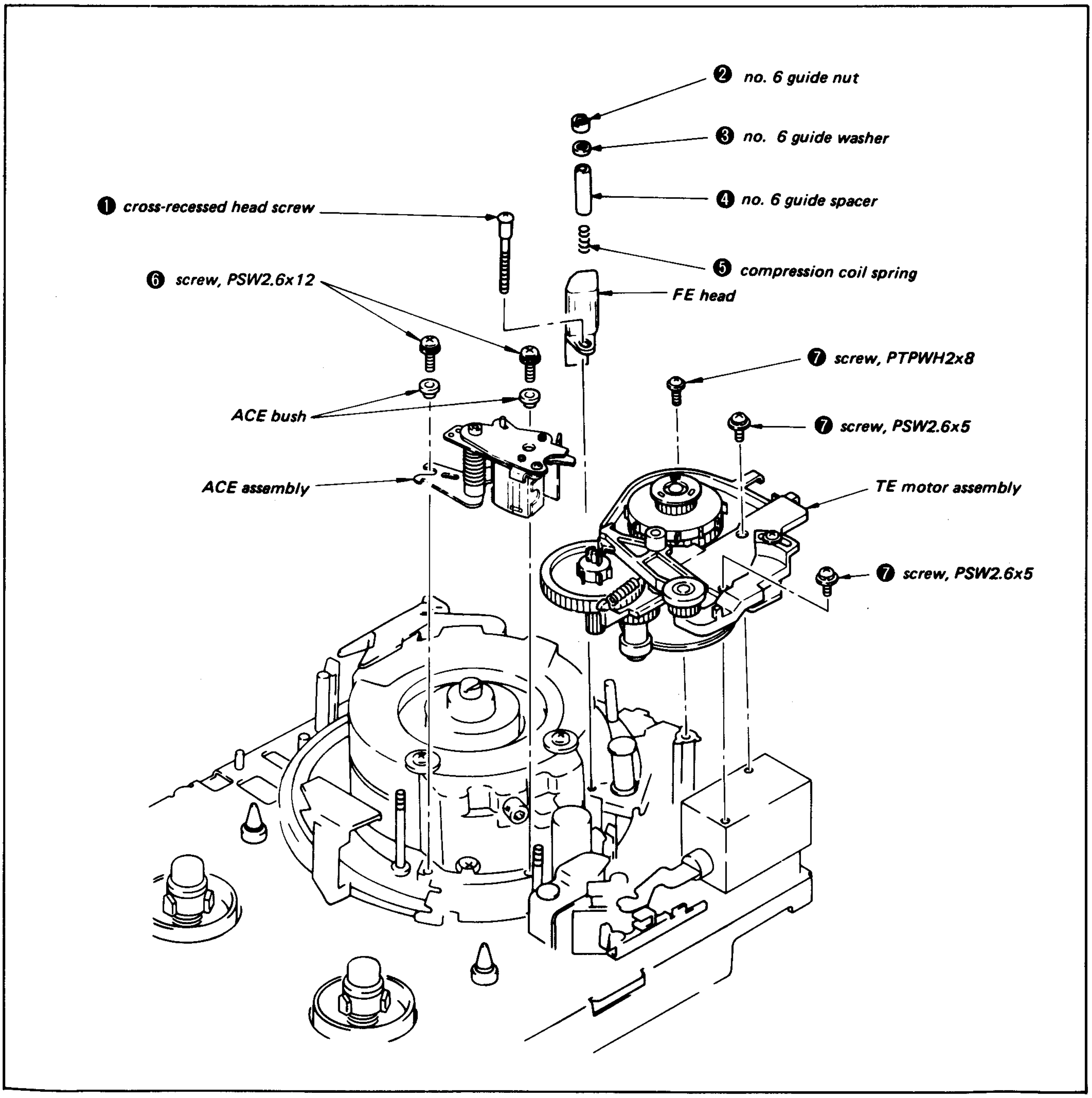

❷ no. 6 guide nut
❸ no. 6 guide washer
❶ cross-recessed head screw
❹ no. 6 guide spacer
❻ screw, PSW2.6x12
❺ compression coil spring
FE head
❼ screw, PTPWH2x8
ACE bush
❼ screw, PSW2.6x5
ACE assembly
TE motor assembly
❼ screw, PSW2.6x5

Fig. 3-18. Removal of the ACE assembly, FE head and TE motor assembly.

Removal of Miscellaneous Parts (Fig. 3-19)

Proceeding in the same manner as in replacement of the drum assembly, measure the width of the gap between the upper drum and the adjusting plates (Fig. 3-5).

1) Remove the screw, then remove the tape guide ground plate and adjusting plates 1 and 2.
2) Remove the two screws, then remove the tape holder assembly.
3) Remove the screw, then remove the guide plate.
4) Remove the 2 PTPWH2×8 screws and the M2.6 screw, then remove shuttle guide 2.
5) Remove the 3 PTPWH2×8 screws and the M2.6 screw. Then remove the 2 claws holding shuttle guide 1-YA in place, and finally remove shuttle guide 1-YA.
6) Remove the slant base assembly.
7) Remove the BVTT2.6×6 screw, then remove the pinch liner link.

Note:

After removing the guide plate, do not thread or unthread a tape with the shuttle guide mounted.

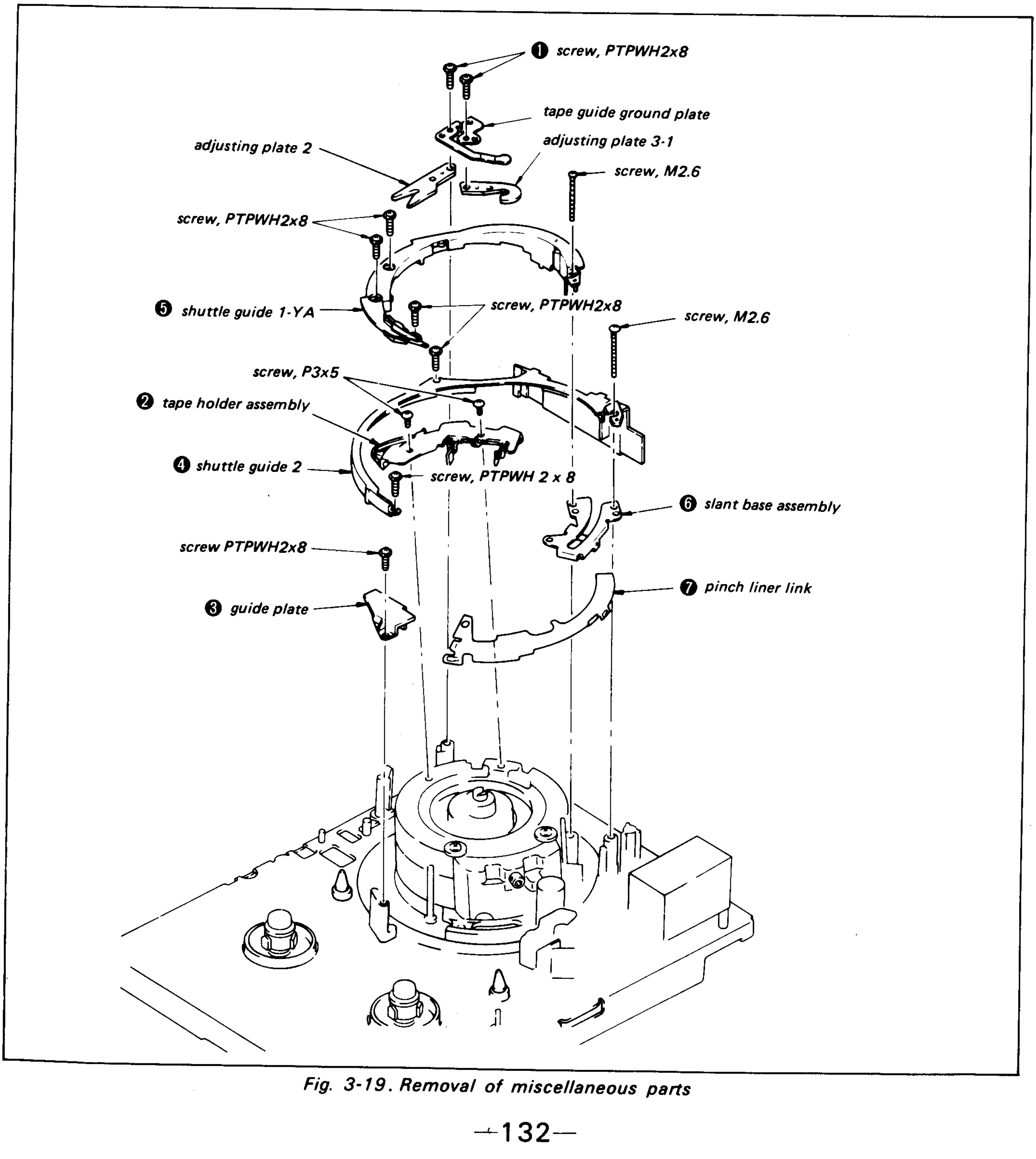

❶ screw, PTPWH2x8
tape guide ground plate
adjusting plate 2
adjusting plate 3-1
screw, M2.6
screw, PTPWH2x8
❺ shuttle guide 1-YA
screw, PTPWH2x8
screw, M2.6
screw, P3x5
❷ tape holder assembly
❹ shuttle guide 2
screw, PTPWH 2 x 8
❻ slant base assembly
screw PTPWH2x8
❼ pinch liner link
❸ guide plate

Fig. 3-19. Removal of miscellaneous parts

3-9-2. Removal of the S Threading Ring (Fig. 3-20)

1) Turn the stop washer and remove the ring roller (B) and (C).
2) Remove the screw, then remove the ring roller adjustment plate.
3) Remove the S threading ring.

Note:
Once a stop washer has been removed, do not use it again.

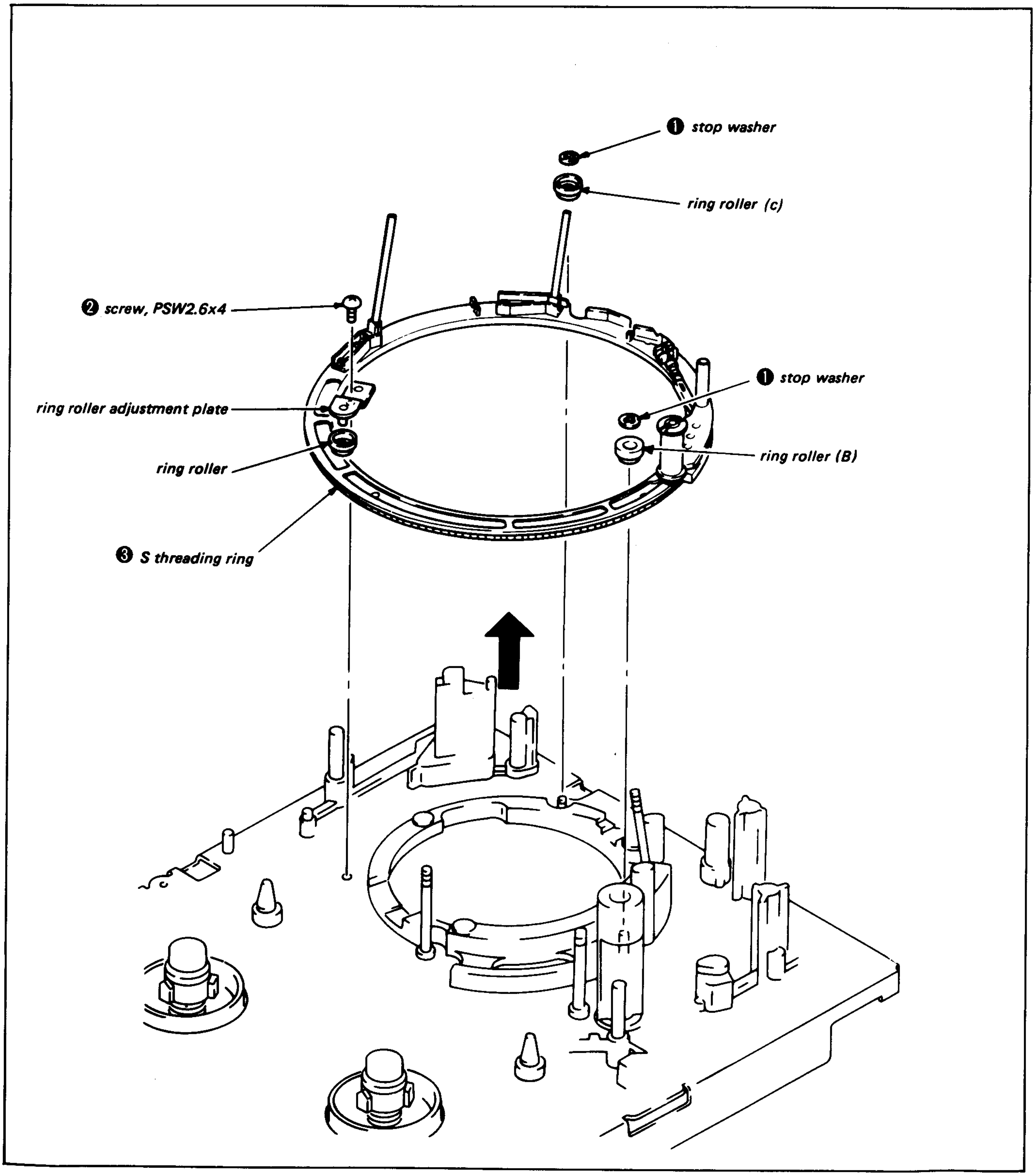

❶ stop washer
ring roller (c)
❷ screw, PSW2.6x4
❶ stop washer
ring roller adjustment plate
ring roller
ring roller (B)
❸ S threading ring

Fig. 3-20. Removal of the S threading ring

3-9-3. S Threading Ring Mounting and Position Adjustment (Fig. 3-21)

1) Set the slider gear assembly in the unthreading completed position.
   (Slider gear assembly set so that it is up against part T slider stop mold.)
2) In this condition, fit the threading ring into place, match the chassis hole (3φ) of part Ⓐ with the S threading ring hole (1.5φ), and mesh with the drive gear teeth.
3) Attach ring roller (B) and fix in place with a stop washer.
4) Attach the ring roller, and fix in place with the adjustment plate.
   Note:
   After replacement and mounting are completed, adjust the ACE assembly as explained in the section on tape path adjustment.

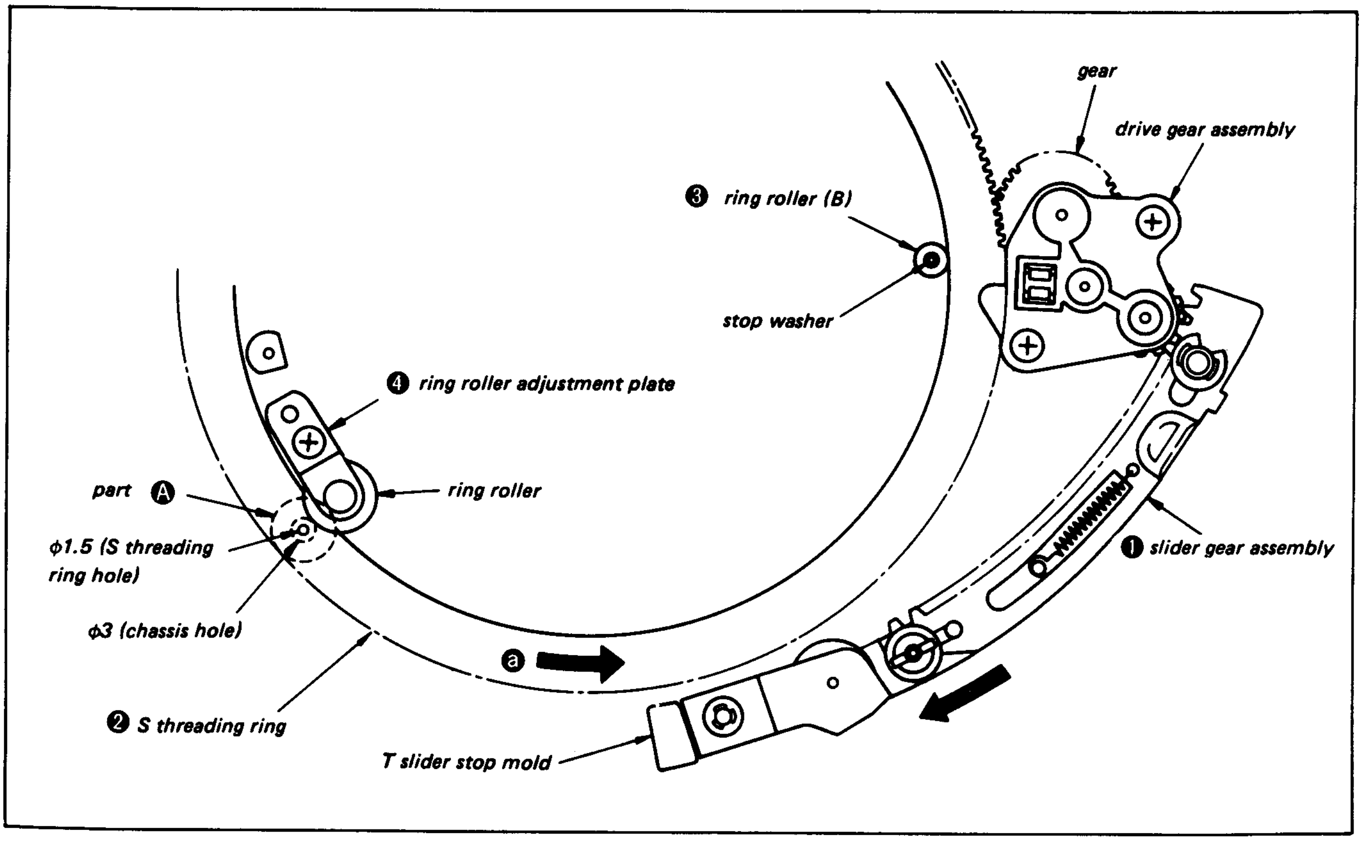

gear
drive gear assembly
❸ ring roller (B)
stop washer
❹ ring roller adjustment plate
part Ⓐ
ring roller
φ1.5 (S threading ring hole)
❶ slider gear assembly
φ3 (chassis hole)
ⓐ
❷ S threading ring
T slider stop mold

Fig. 3-21. S threading ring position adjustment

3-10. PINCH SNAP-FIT LIMITER GAP CHECK AND ADJUSTMENT

[Method of checking]

1) Set in the threading completed condition.
2) With the plunger pushed in all the way, confirm that the thickness of the pinch snap-fit limiter gap is 0.4 mm to 0.6 mm. If it is not, adjust as explained under [method of adjustment] below.

[Method of adjustment]

1) With the pinch solenoid in the absorbed condition (when the plunger is pushed in all the way), loosen the adjustment screw.
2) Press the pinch limiter adjustment plate in the direction of arrow ⓐ with an ordinary screwdriver, as in section Ⓐ in the diagram, and adjust until the thickness of the gap in 0.4 mm to 0.6 mm.

   Tighten the adjustment screw and then lock it to fix everything in place.

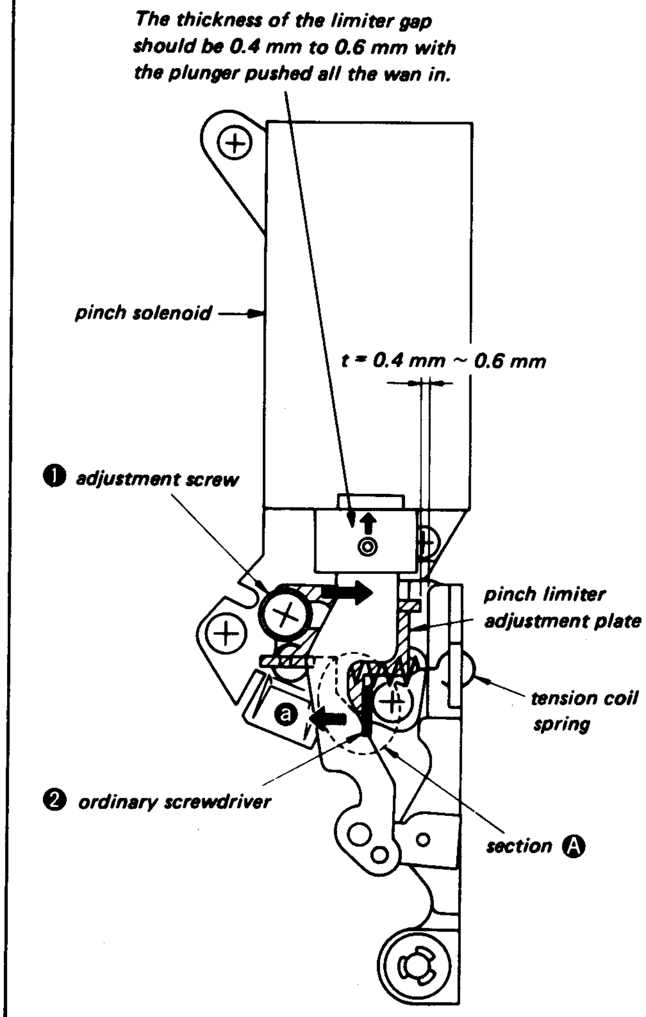

The thickness of the limiter gap should be 0.4 mm to 0.6 mm with the plunger pushed all the wan in.
pinch solenoid
t = 0.4 mm ~ 0.6 mm
❶ adjustment screw
pinch limiter adjustment plate
tension coil spring
ⓐ
❷ ordinary screwdriver
section Ⓐ

Fig. 3-22. Pinch snap-fit limiter gap adjustment plate

3-11. THREADING END SWITCH AND T COIL SENSOR

3-11-1. Threading End Switch (TE Switch) Position Check and Adjustment

[Method of checking]

Turn the S threading ring manually. Check to make sure that, when the lock roller moves from above the straight line part of the notch in the ring (Fig. 3-23 section Ⓐ) to 1/3 of the way down it and back, the TE switch turns ON and OFF.
If the lock roller has to move outside of this range before the switch will turn ON and OFF, adjust as explained below.

[Method of adjustment]

1) Set the lock roller between the top of the notch in the S threading ring and 1/3 of the way down it, turn the TE switch in the direction of the arrow and, when the switch turns ON, fix the TE switch in place.
2) When the adjustment is completed, repeat the check as described above [method of checking].

[Removal]

1) Remove the tension coil spring that is attached to the S coil sensor assembly, then remove the S coil sensor.
2) Remove the lock arm assembly in te direction of arrow Ⓐ

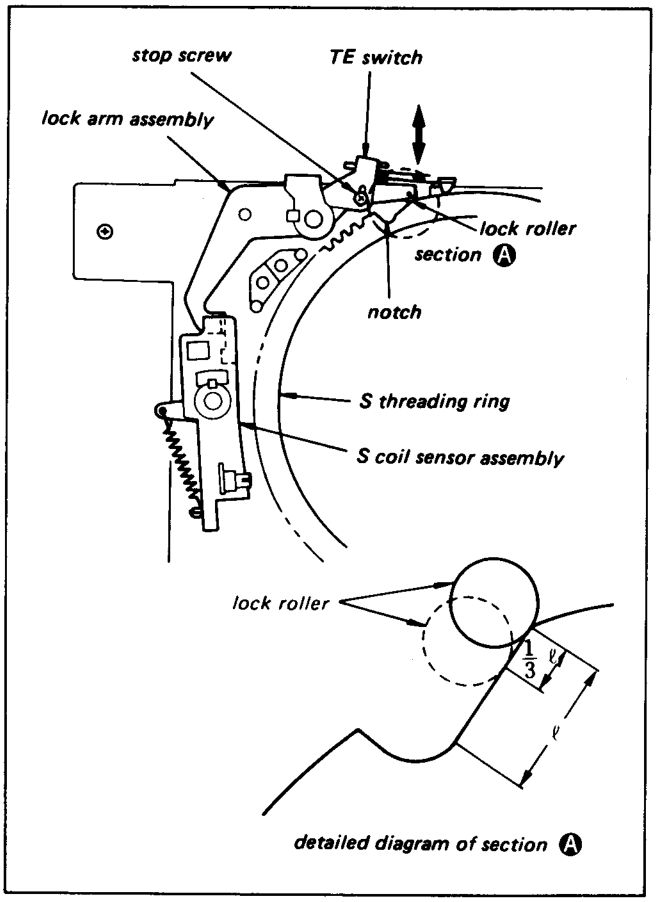

stop screw
TE switch
lock arm assembly
lock roller
section Ⓐ
notch
S threading ring
S coil sensor assembly
lock roller
$\frac{1}{3}\ell$
ℓ
detailed diagram of section Ⓐ

Fig. 3-23. TE switch position adjustment

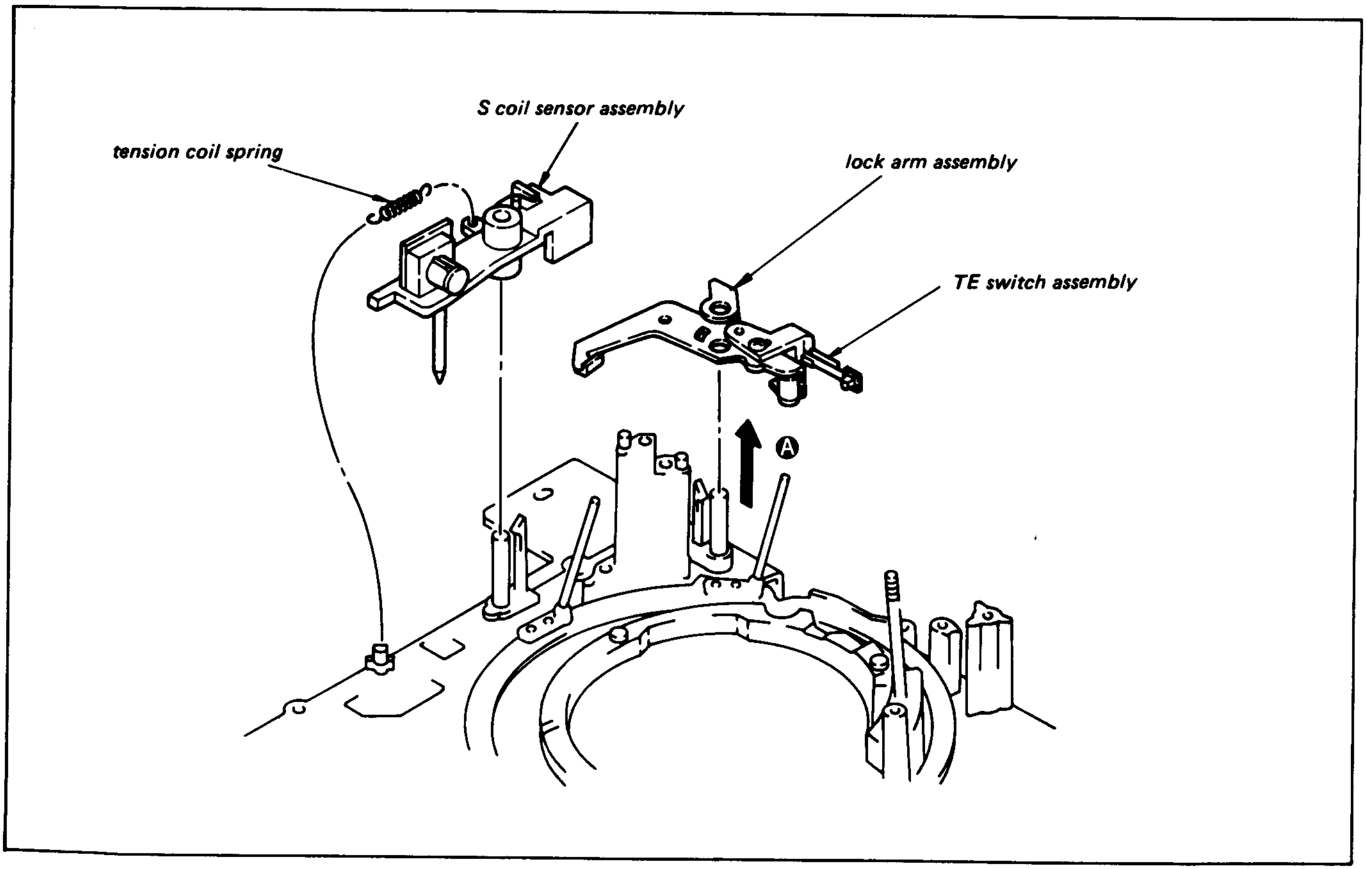

S coil sensor assembly
tension coil spring
lock arm assembly
TE switch assembly
Ⓐ

Fig. 3-24. Removal of the TE switch assembly and lock arm assembly

3-11-2. T Coil Sensor Mounting and Operation Check

[Method of checking]

Confirm that T coil sensor link ❶ is pressed and T coil sensor ❷ moves in the direction of arrow Ⓑ when the T slider gear assembly is moved in the direction of arrow Ⓐ.

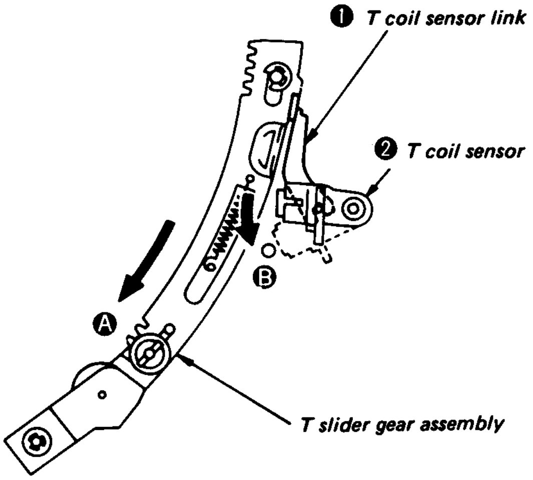

❶ T coil sensor link
❷ T coil sensor
Ⓐ
Ⓑ
T slider gear assembly

Fig. 3-25. T coil sensor operation check.

[Method of mounting]

1) Place T coil sensor link in the prescribed position.
2) Match up the T coil sensor hole with the chassis shaft Ⓐ and insert. Place so that it engages with T coil sensor link.
3) Hook the tension coil spring on the T coil sensor and chassis claw.

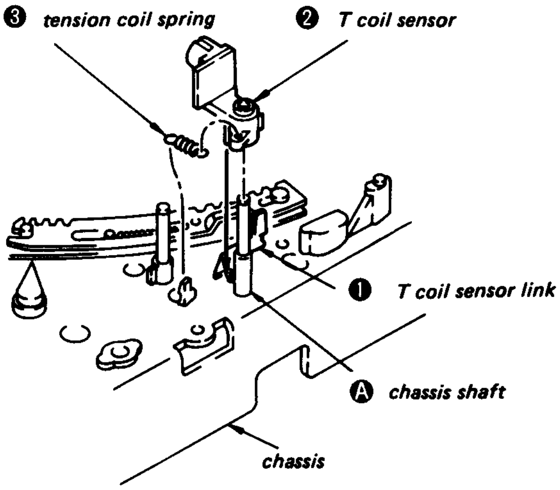

❸ tension coil spring
❷ T coil sensor
❶ T coil sensor link
Ⓐ chassis shaft
chassis

Fig. 3-26 T coil sensor link and T coil sensor mounting.

3-12. REMOVAL AND ADJUSTMENT OF THE REEL BLOCK ASSEMBLY

3-12-1. Removal of the Reel Block Assembly

1) Remove the four screws (BVTP3 x 8) ❶ .
2) Remove the reel block assembly ❷ in the direction shown by the arrow.

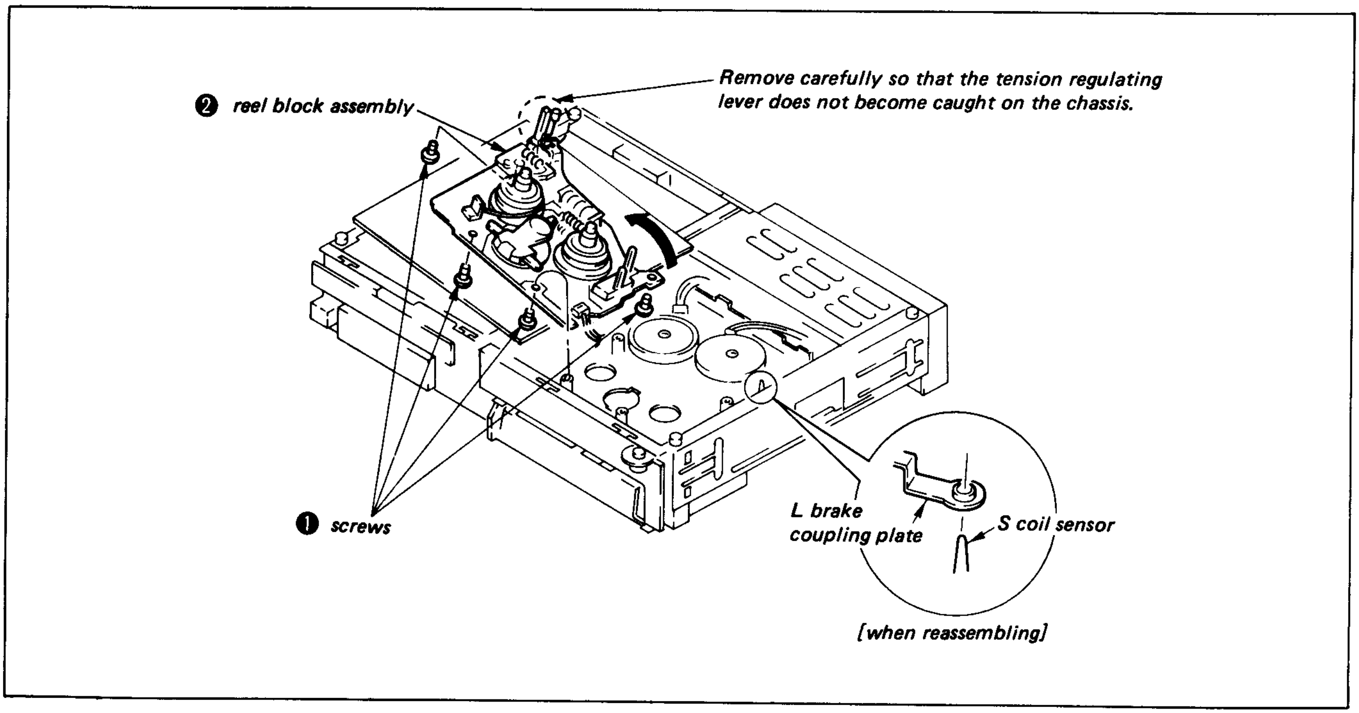

❷ reel block assembly
Remove carefully so that the tension regulating lever does not become caught on the chassis.
❶ screws
L brake coupling plate
S coil sensor
[when reassembling]

Fig. 3-27 Removal of the reel block assembly

3-12-2. Adjustment of the Position of the Tension Regulating Lever

[Method of adjustment]

1) Put the unit in playback mode.
2) Loosen the adjustment spring until the tape guide pin of the tension regulating lever assembly is positioned to the outside of the outer circumference of shuttle guide 2. as shown in Fig. 3-28. Then adjust by moving the tension regulating band assembly in the direction of arrow Ⓐ .
3) After adjustment, tighten the adjustment screw, being careful that the tension regulating band assembly does not move.

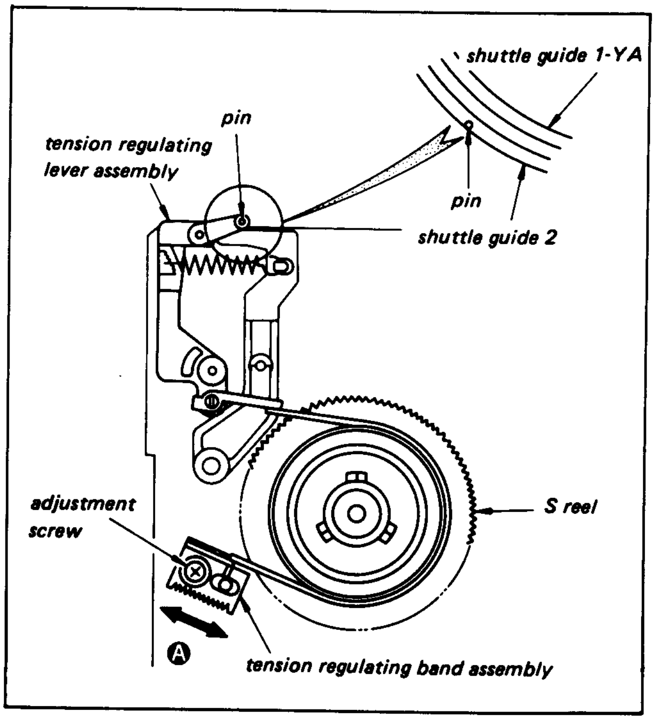

shuttle guide 1-YA
pin
tension regulating lever assembly
pin
shuttle guide 2
S reel
adjustment screw
Ⓐ
tension regulating band assembly

Fig. 3-28 Adjustment of the position of the tension regulating lever

3-13. ADJUSTMENT OF THE FORWARD BACK TENSION

[Method of measurement]

1) Insert the torque cassette (SL-0003C) and put the unit in playback mode.
2) Read the value on the meter on the S reel side after the needle has gone around about once.

   The correct value is 31 g·cm – 35 g·cm

Notes:

i) The set must be perfectly level during this measurement.

ii) After the measurement, the tape can become slack when the stop button is pressed. If this happens set the unit is forward mode to take up the slack before removing the tape.

[Method of adjustment]

Move the position of the tension coil spring that is hooked on the tension regulating lever assembly in the direction of arrow Ⓐ until the measured value falls within the correct range.

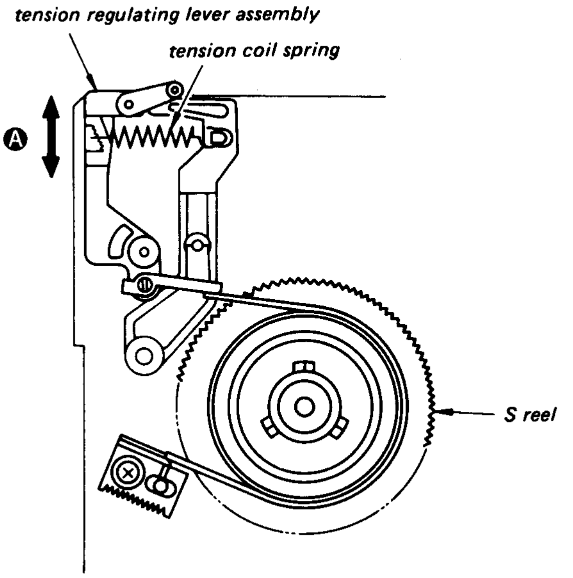


Fig. 3-29 Adjustment of the back tension

3-14. ADJUSTMENT OF THE FORWARD TORQUE

[Method of measurement]

1) Insert the torque cassette (SL-0003C) and start to record a telecast.
2) Read the value on the meter on the T reel side after the needle has gone around about once. The correct range is 80g • cm ± 5g • cm.

[Method of adjustment]

1) Remove the front panel.
2) Turn potentiometer RV308 on SS-34 board to adjust the torque until its value falls within the correct range.

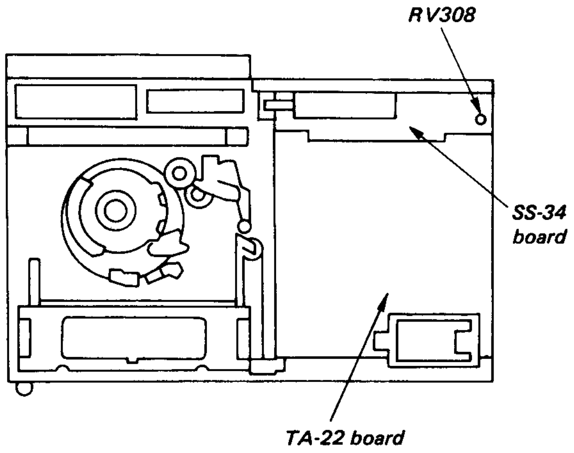


Fig. 3-30. Adjustment of the forward torque

Note:

When the forward torque is weakened during the measurement the tape can become slack, in which case the set will go into emergency stop mode. In such a case, the only switches that will work are the cassette eject switch and the power switch. It is necessary to temporarily remove the cassette, or to turn the power OFF and back ON.

4. TAPE PATH ADJUSTMENT

4-1. TRACKING ADJUSTMENT

This adjustment has a large effect on the picture quality in each mode and on the interchangeability of tapes, so it should be done carefully.

4-1-1. Preparation for adjustment
4-1-2. Adjustment on the entrance side
4-1-3. Adjustment on the exit side

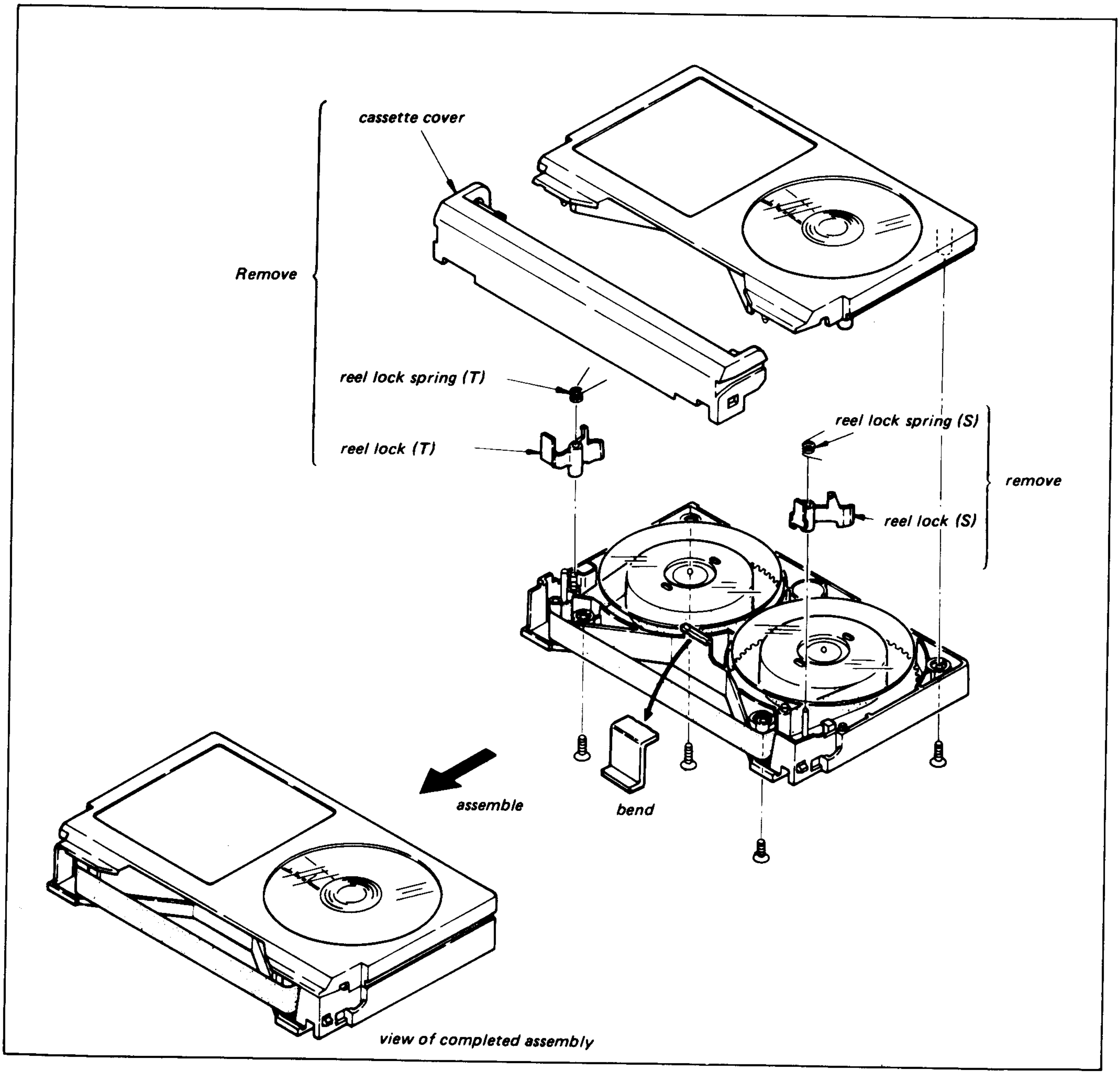
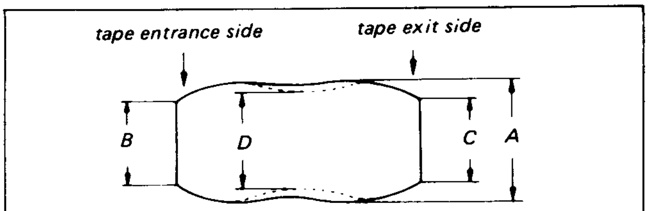

cassette cover
Remove
reel lock spring (T)
reel lock (T)
reel lock spring (S)
remove
reel lock (S)
assemble
bend
view of completed assembly

Fig. 4-1.

4-1-1. Preparation for Adjustment

1) Remove the cassette cover of the alignment tape in accordance with Fig. 4-1.
2) Clean the surface contacted by traveling tape (tape guide, drum tape trailing surface capstan shaft pich roller. ACE FE head surface) with a chamois cloth dipped in methanol.
3) Connect the oscilloscope as follows:
   Channel 1: Pin ⑥ of CN502 (RP-20 board)
   External trigger: Pin ③ of CN502 (RP-20 board)
4) Play back the 1 kHz signal on the traking section of the alignment tape.
5) Confirm that the oscilloscope radio frequency output waveform is flat and that the amplitude is a maximum. (Turn the tracking knob right and left to increase and decrease the amplitude while the waveform remains flat.) When the amplitude of the waveform is a maximum, confirm that the fluctuations and contact of the radio frequency output waveform meet the standards given in Fig. 4-2. If they do not, go through the procedure given in step 6).
6) If the entrance waveform cannot be made flat, as shown in Fig. 4-3 (a), by turning the tracking knob, go through the "entrance side adjustment" described in 4-1-2; if the exit waveform shown in Fig. 4-3 (b) cannot be made flat, go through the "exit side adjustment" in 4-1-3.



standards: at the maximum of the tracking control knob

contact: $\frac{B}{A} \geq 0.7$

$\frac{C}{A} \geq 0.7$

amount of fluctuation: $\frac{D}{A} \geq 0.9$

Fig. 4-2.

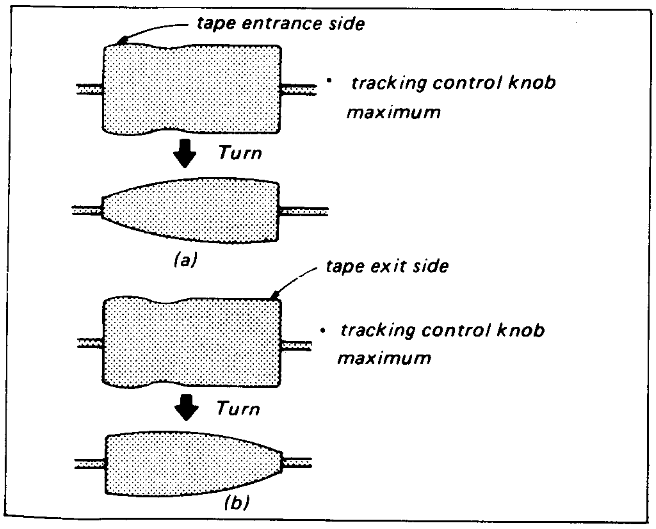

tape entrance side
• tracking control knob maximum
Turn
(a)
tape exit side
• tracking control knob maximum
Turn
(b)

Fig. 4-3.

4-1-2. Entrance Side Adjustment

Whenever the entrance side adjustment is performed, the exit side adjustment must also be performed. The various tape guides and adjustment positions are shown in Fig. 4-5.

1) Turn the No. 6 guide counterclockwise to free the movement of the tape as it enters the drum.
2) Turn the tracking control knob to the right until the amplitude of the waveform is about 60% of its maximum.
3) Loosen No. 5 guide lock screw ❶ and turn the No. 5 guide until the entrance waveform sticks up a little above falt, as shown in the figure below. Then tighten the No. 5 guide lock screw (Fig. 4-6).

   Note:

   After tightening No.5 guide lock screw ❶, confirm that it is as in the figure below.

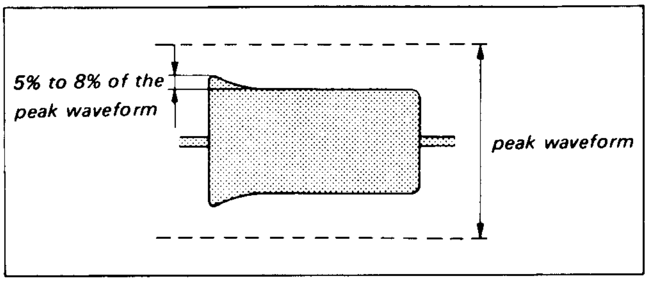


Fig. 4-4.

4) Next, lower the No. 6 guide until the waveform is flat.
5) Press the tape down between the No. 4 and No. 5 guide with a finger to lower the entrance side radio frequency waveform, then let go and confirm that the waveform returns to what it was before.
6) In this condition, check the clearance and curl of the No. 5 guide. If there are clearance and curl, adjust as explained in subsequent sections.

Note:

The tape tension between the No. 3, No. 4 and No. 5 guides must be balanced. If it is not, adjust the tilt of the No. 3 and No. 5 guides.

If the waveform cannot be made to look as shown in Fig. 4-4, or if when the tape is pressed and released on the entrance side it takes time for the waveform to return to what it was before, or if it does not return to what it was before, adjust according to the instructions given below.

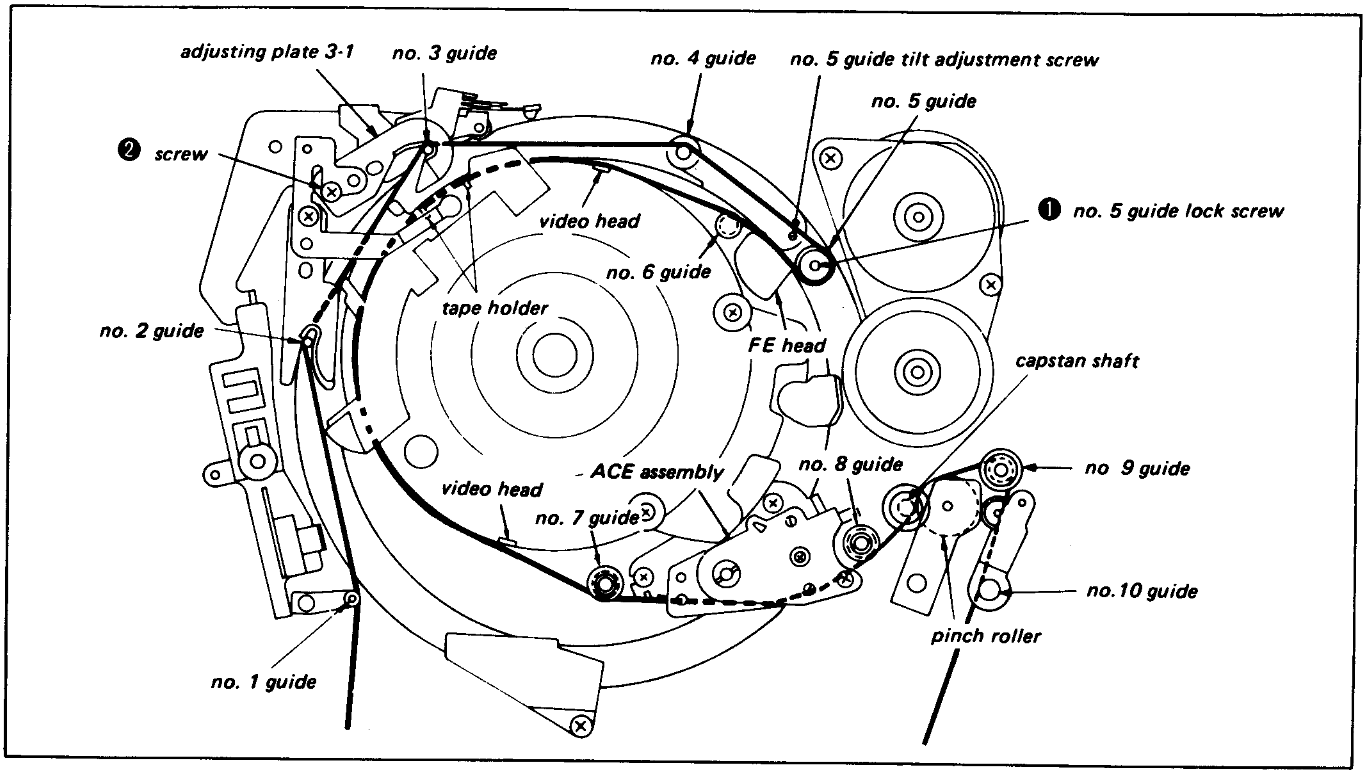

adjusting plate 3-1
no. 3 guide
no. 4 guide
no. 5 guide tilt adjustment screw
no. 5 guide
❷ screw
❶ no. 5 guide lock screw
video head
no. 6 guide
tape holder
no. 2 guide
FE head
capstan shaft
ACE assembly
video head
no. 8 guide
no 9 guide
no. 7 guide
no.10 guide
pinch roller
no. 1 guide

Fig. 4-5. Tape guide layout diagram

[What to do when the waveform entrance output will not rise]

1) Check to see if the up-down tension between the No. 3, No. 4 and No. 5 guides is uniform. If it is not, adjust the tilt of the No. 3 and No. 5 guides.

   Note:

   The lower flange of the No. 4 guide must not protrude.

2) Raise the lower flange of the No. 4 guide to raise the entrance output.

   Note:

   It is sufficient to raise the lower flange of the No. 4 guide to 0.4 mm from its lowest position (within a rotation angle of 360°).

3) If the operation performed in step 2) fails to raise the waveform output, turn the No. 5 guide tilt adjustment screw slightly to the left, and the entrance output should rise.

[What to do when the waveform entrance output will not drop]

1) Remove the adjusting plate 3-1 of the No. 3 guide from the drum. Just before the lower tension of the tape becomes slack, tighten screw ❷ .
2) If the tape is in contact with the lower flange of the No. 4 guide, lower the flange. If the tape is sticking up from the lower flange, adjust the tilt of the No. 5 guide so that the tape does not stick up from the lower flange of the No. 4 guide.

[What to do when there is a clearance in the No. 5 guide]

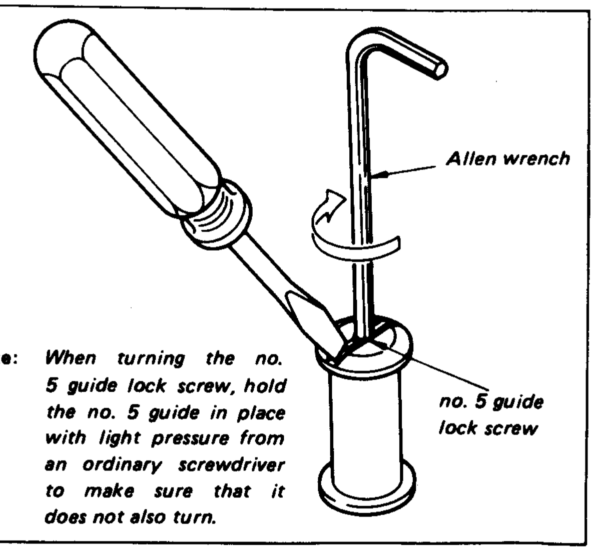
Turn the No. 4 guide counterclockwise to run the tape upward and eliminate the clearance in the No. 5 guide.

Note:

At this time make sure that a large curl is not produced below the No. 4 guide.

[What to do when there is a curl]

1) When there is a gap below the No. 4 guide: Just before the lower tension on the tape becomes slack, move adjusting plate 3-1 of the No. 3 guide to the outside.
2) When there is not a gap below the No. 4 guide (when there is a curl below the No. 4 guide):
   i) Check to see if the No. 4 guide has been raised up too high. If it has been raised up too high, turn the adjusting plate clockwise to lower the No. 4 guide.
   ii) If the curl still has not been removed after i), tighten the No. 5 guide tilt adjustment screw in the clockwise direction until the curl is removed.


Allen wrench
no. 5 guide lock screw

Note: *When turning the no. 5 guide lock screw, hold the no. 5 guide in place with light pressure from an ordinary screwdriver to make sure that it does not also turn.*

Fig. 4-6.

4-1-3. Exit Side Adjustment

1) Connect the oscilloscope to pin ⑥ of CN502 (RP-20 board). Connect the external trigger to pin ③ of CN502.
2) Play the tracking section of the alignment tape. Adjust the tracking knob to reduce the amplitude of the radio frequency output waveform to 60% of its maximum level.
3) Watch the radio frequency output waveform when the No. 7 and No. 8 guides are raised (by turning the respective guide nuts counterclockwise) to let the tape run free. This waveform is called to exit free waveform.

   Note:

   Be careful not to raise the guides too far. They should be raised only about 0.2 to 0.3mm.

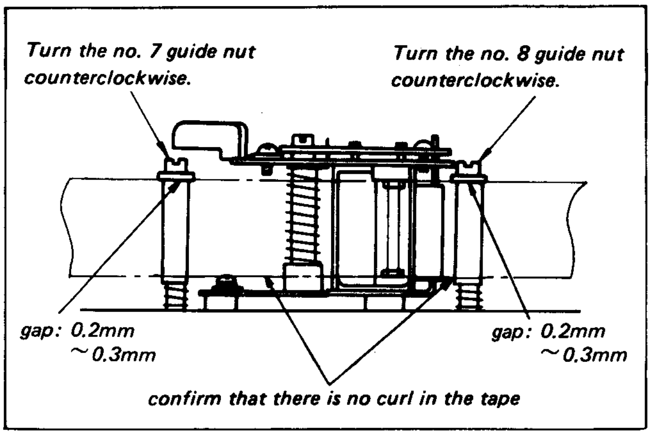

Turn the no. 7 guide nut counterclockwise.
Turn the no. 8 guide nut counterclockwise.
gap: 0.2mm ~0.3mm
gap: 0.2mm ~0.3mm
confirm that there is no curl in the tape

Fig. 4-7.

4) At this time, confirm that the exit free waveform is within the range shown in Fig. 4-8(a) and (b).
   - If it is outside of this range, adjust according to the procedure in 4-3.

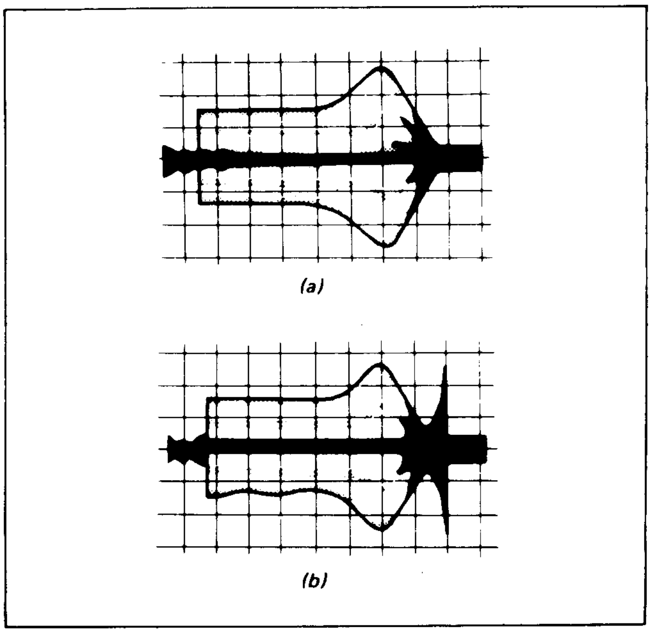


Fig. 4-8.

5) Turn the No. 7 guide nut clockwise until the waveform is flat.
6) Turn the No. 8 guide nut clockwise until the No. 8 guide is lined up with the tape (just before the waveform starts to change lower the guide until there is no curl).
7) During playback, confirm that no curl occurs in the No. 7 guide or the No. 8 guide.
8) During review confirm that no curl or clearance occurs in the No. 8 guide. If there is a curl or clearance, adjust using the No. 9 guide. After adjustment, lock the guide nut.

4-2. ADJUSTMENTS AFTER REPLACEMENT OF THE ACE ASSEMBLY

After removal or replacement of the ACE assembly perform the adjustments listed below.

4-2-1. Exit side tracking adjustment
4-2-2. CTL head (ACE assembly) position adjustment
4-2-3. Audio head (ACE assembly) azimuth adjustment
4-2-4. Audio head (ACE assembly) height adjustment

4-2-1. Exit Side Tracking Adjustment

1) Set the parallel plate (SL-0657 in the list of fixtures and tools) up against the unit as shown in Fig. 4-9. and turn the tilt adjustment screw to adjust the audio head vertically.

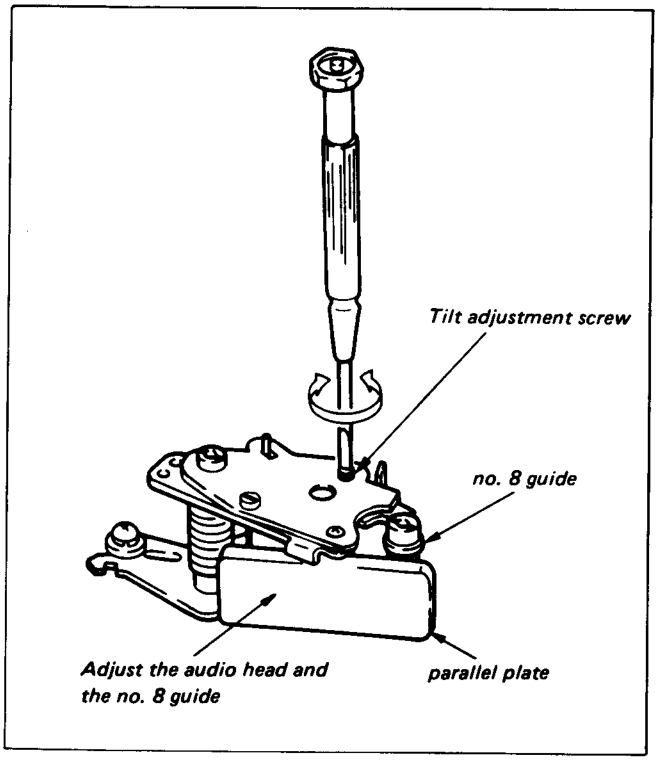

Tilt adjustment screw
no. 8 guide
Adjust the audio head and the no. 8 guide
parallel plate

Fig. 4-9.

2) Connect the oscilloscope to pin ⑥ of connector CN502 (RP-20 board). Connect the external trigger to pin ③ of CN502.
3) Play the tracking section of the alignment tape. Adjust the tracking knob until the radio frequency output waveform amplitude is reduced to about 60% of its maximum level. maximum level.
4) Raise the No. 7 and No. 8 guides (turn the respective guide nuts counterclockwise) and observe the radio frequency exit free waveform when the tape runs free.

Note:

Be careful not to raise the guide too far. Raise it about 0.2 to 0.3 mm.

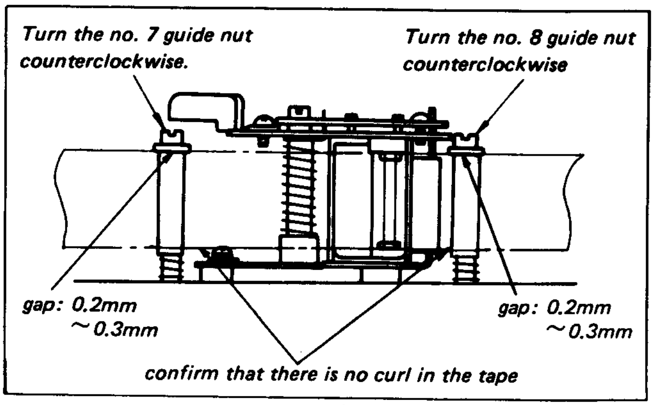

Turn the no. 7 guide nut counterclockwise.
Turn the no. 8 guide nut counterclockwise
gap: 0.2mm ~0.3mm
gap: 0.2mm ~0.3mm
confirm that there is no curl in the tape

Fig. 4-10.

5) At this time. confirm that the exit free waveform is within the range shown in Fig. 4-11(a) and (b).

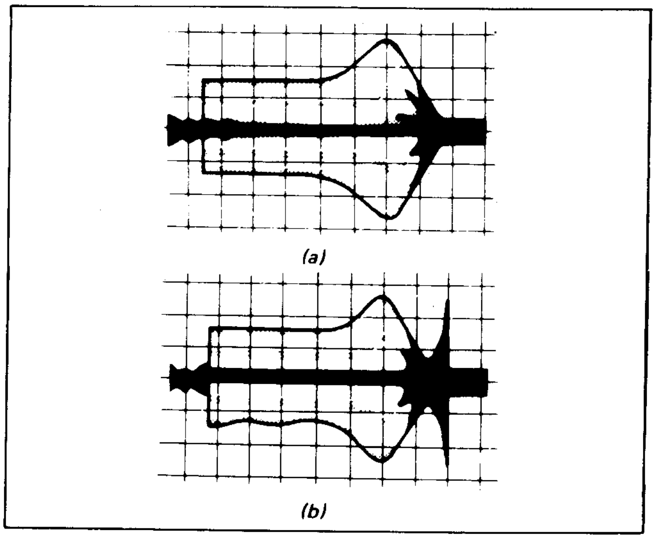


Fig. 4-11.

[When the waveform is outside this range]

- When the waveform is outside this range and has the form shown in Fig.4-12. turn the tilt adjutment screw clokwise to adjust until the waveform is whthin the required range.

Note:

Complete the adjustment by turning the adjustment screw in the direction of tightening (clockwise).

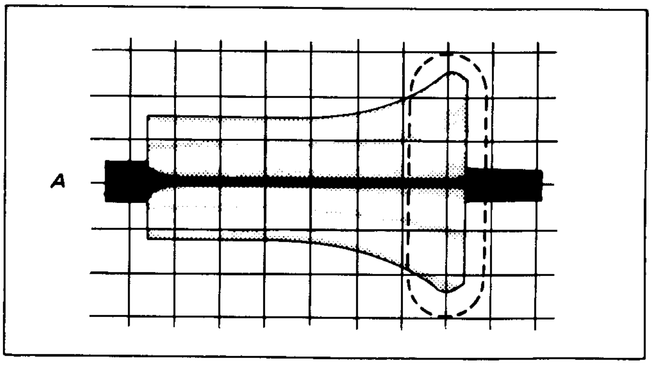


Fig. 4-12.

- When the exit free waveform is outside of the required range and has the form shown in Fig. 4-13, turn the tilt adjustment screw counterclockwise to produce waveform A (Fig. 4-12), then turn it clockwise to bring the waveform within the required range.

Note:

Finish the adjustment by turning the adjustment screw in the direction of tightening (clockwise).

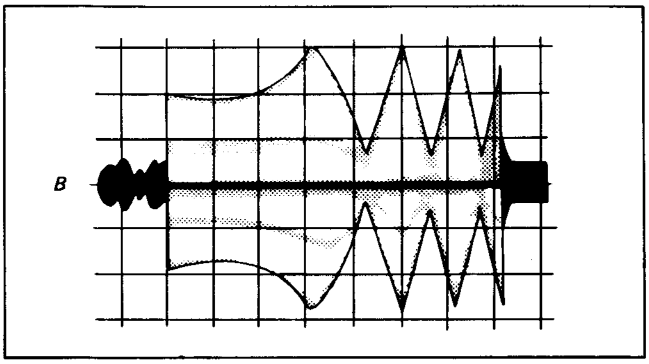


Fig. 4-13.

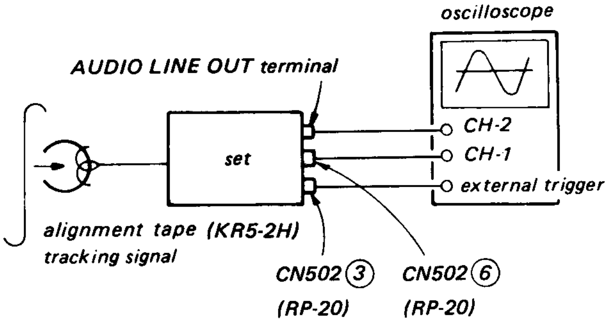
6) Turn the No. 7 guide nut clockwise to flatten the waveform.
7) Turn the No. 8 guide nut clockwise to line the No. 8 guide up with the tape (lower it so that there is no curl just before the waveform starts to change).
8) If the radio frequency waveform is as shown in Fig. 4-12 on the exit side, repeat the adjustment.

4-2-2. CTL Head (ACE Assembly) Position Adjustment

This adjustment includes the mechanical CTL head mounting position adjustment and the electrical tracking control center adjustment. The tracking control center adjustment is to be performed first, followed by the mechanical adjustment of the head mounting position.

[Connections]

1) Playback


oscilloscope
AUDIO LINE OUT terminal
set
CH-2
CH-1
external trigger
alignment tape (KR5-2H)
tracking signal
CN502③
(RP-20)
CN502⑥
(RP-20)

[Method of adjustment]

1) Play the tracking signal section of the alignment tape.
2) Turn the tracking control knob clockwise or counterclockwise to the center click position. Confirm that the amplitude of the radio frequency output signal is at its maximum level. Also confirm that the audio signal 0 level position occurs at the location of the channel B waveform. If the necessary standards are not met follow the procedure in 3).

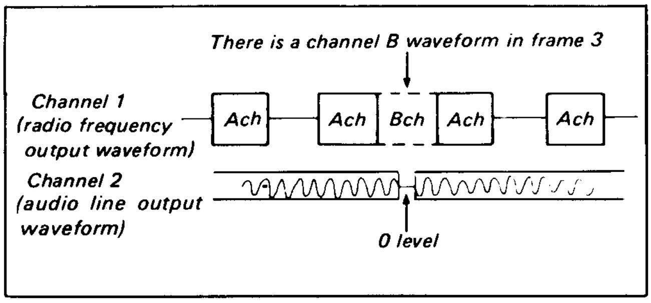

There is a channel B waveform in frame 3
Channel 1
(radio frequency output waveform)
Ach
Ach
Bch
Ach
Ach
Channel 2
(audio line output waveform)
0 level

Fig. 4-14.

3) Tracking center adjustment
Refer to electrical adjustment 3) in section 5-3-2.
4) CTL head position adjustment
    a. Set the tracking control knob at the center click position.
    b. Loosen the 2 ACE assembly position adjustment screws, then use a tool such as an ordinary screwdriver to slide the ACE assembly to where the radio frequency output waveform amplitude becomes a maximum.
    c. Play the color bar signal on the alignment tape and check the picture quality.
    d. Tighten the position adjustment screws, then lock them.

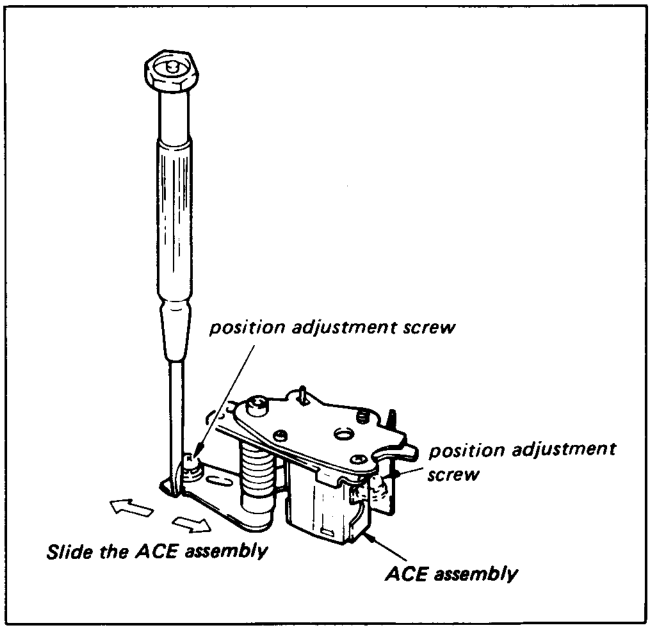
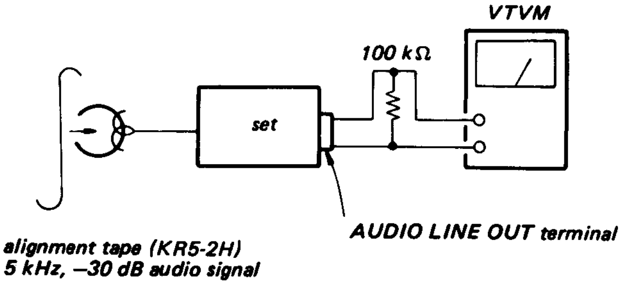

position adjustment screw
position adjustment screw
Slide the ACE assembly
ACE assembly

Fig. 4-15.

4-2-3. Audio head (ACE Assembly) Azimuth Adjustment

[Connections]

1) Playback


VTVM
100 kΩ
set
AUDIO LINE OUT terminal
alignment tape (KR5-2H)
5 kHz, –30 dB audio signal

[Method of adjustment]

1) Play the 5kHz. –30dB audio signal section (RF sweep section) of the alignment tape.
2) Adjust the azimuth adjustment screw until the output level (VTVM indication) is a maximum.
   Note:
   Complete the adjustment by turning the adjustment screw in the direction of tightening (clockwise).
3) After adjustment, lock the adjustment screw.

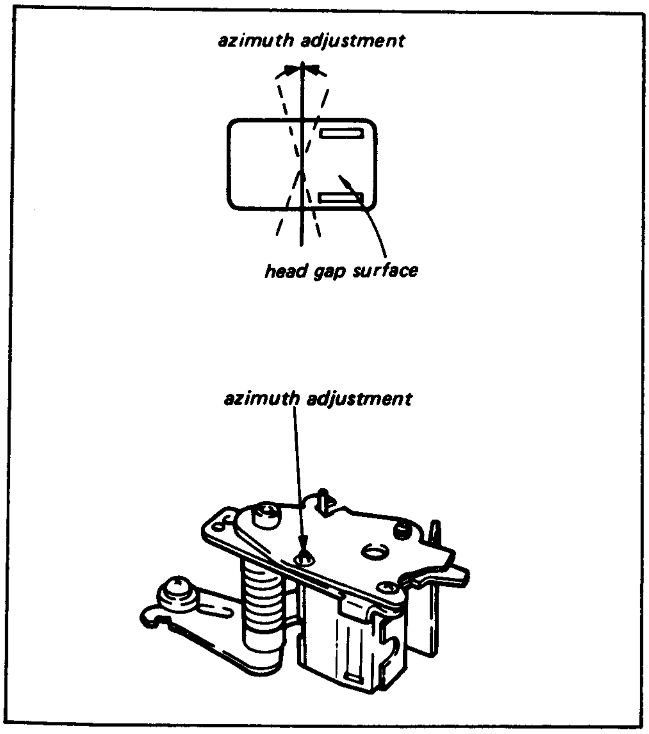

azimuth adjustment
head gap surface
azimuth adjustment

Fig. 4-16.

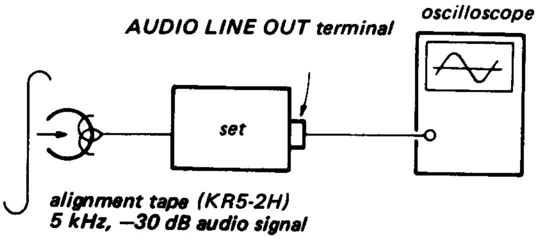
4-2-4. Audio Head (ACE Assembly) Height Adjustment

[Condition]

This adjustment must only be performed after the exit side tracking adjustment has been completed.

[Connections]

1) Playback


AUDIO LINE OUT terminal
oscilloscope
set
alignment tape (KR5-2H)
5 kHz, –30 dB audio signal

[Method of adjustment]

1) Play the 5kHz. –30dB audio signal section (RF sweep section) of the alignment tape.
2) Adjust the height adjustment nut so that the amplitude of the audio line output waveform (5 kHz) becomes a maximum.

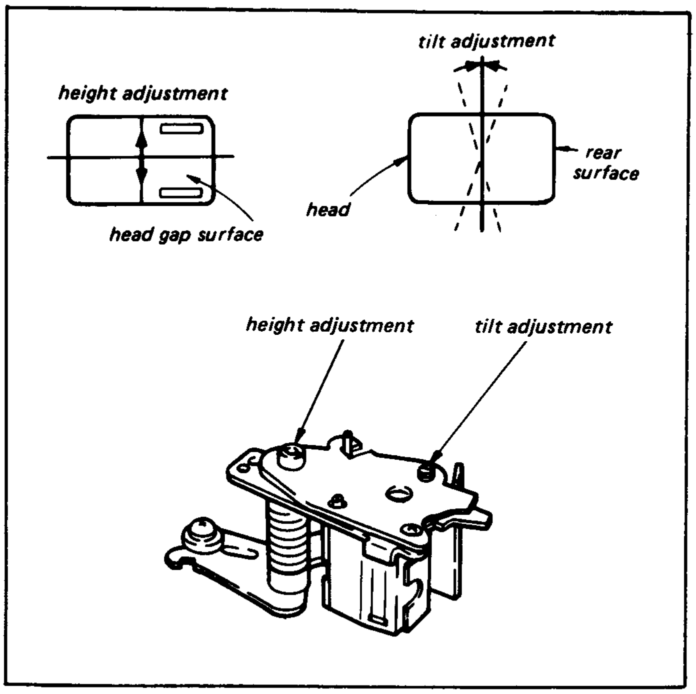

tilt adjustment
height adjustment
rear surface
head
head gap surface
height adjustment
tilt adjustment

Fig. 4-17.

4-3. HOW TO INSPECT THE TAPE TRAVELING WHEN ADJUSTING THE TAPE PATH

Adjust and check the tape path using the alignment tape following the adjustment guide, then check the tape travel using the procedure below.

1) Get one L-830 reel ready (these are widely available commercially). Remove the cassette cover referring to Fig. 4-1 of the adjustment guide.
2) Run the L-830 tape in playback mode and check the following points.
   i) Entrance side
      Confirm that the tape contacts the upper flange of the No. 5 and No. 6 guides and the lower flange of the No. 4 guide, and is not damaged or bent. (Some tape curl is allowed but the tape must not be creased.) (Fig. 4-18)
   ii) Exit side
      Confirm that the tape does not contact the upper flange of the No. 7 guide or the No. 8 guide, or the upper or lower flange of the No. 10 guide, and is not scratched. (Some tape curl is allowed but the tape must not be creased.) **(Fig. 4-19)**
   iii) If the tape was found to not be running correctly in step ii), readjust the tape path using the alignment tape, following the adjustment guide.
      If the tape is not running correctly on the entrance side, refer to section 4-1-2 of the adjustment guide.
      If the tape is not running correctly on the exit side, refer to section 4-1-3 of the adjustment guide.

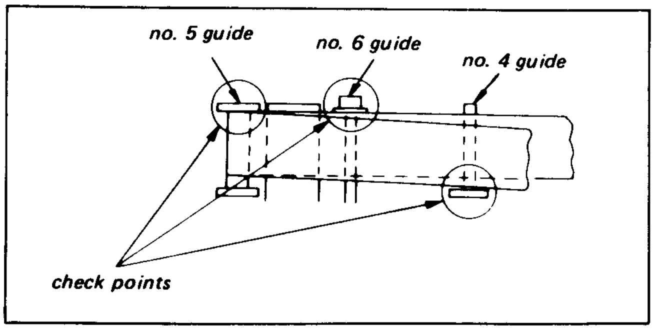


Fig. 4-18.

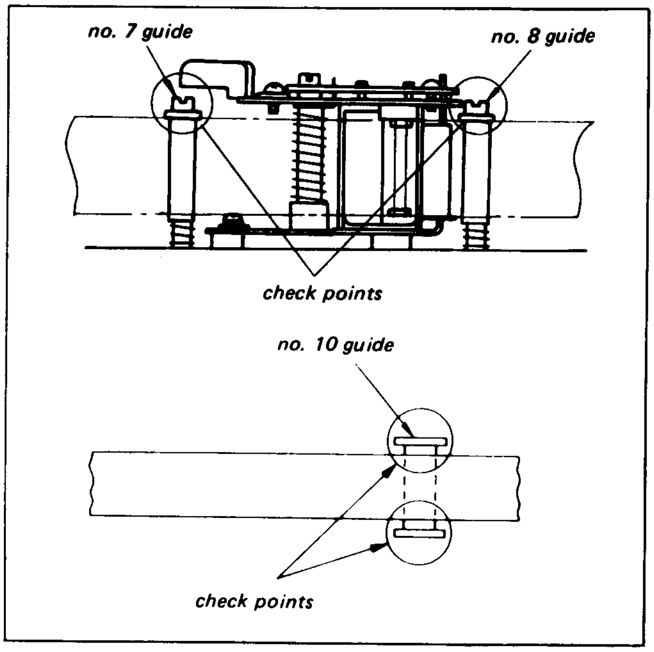


Fig. 4-19.

5. ELECTRICAL ALIGNMENT

All the electrical alignment can be performed by using the equipment mentioned below, the alignment tape, and the PAL colour bar signal (100%).

[Equipment Required]

(1) PAL Colour Monitor TV
(2) Oscilloscope, Dual-trace, Bandwidth ... more than 10 MHz with delay mode
(3) Frequency Counter
(4) PAL Colour-Bar Generator
(5) Digital voltmeter
(6) Audio Signal Generator
(7) Audio level meter (VTVM)
(8) Attenuator
(9) Alignment Tape, type: KR5-2H, Code No. 8-969-995-52
(10) Alignment Tool (Adjusting screwdriver for semi-fixed resistors and coils)
Jig No. SL-0001, Code No. J-6080-001-A

[Setup for Alignment]

The antenna should be connected correctly to the antenna input terminal of the videocassette recorder.

It is important that the video output signal satisfies the specification because the telecast signal received by the incorporated tuner of the videocassette recorder is utilized as the adjustment signal of the machine. The incorporated tuner should be set to the channel with the best reception. The video signal should be checked with an oscilloscope connected to VIDEO OUT (BNC connector). Verify that the sync signal amplitude is approx. 0.3 Vp-p and the video signal amplitude is approx. 0.7 Vp-p at peak. Adjust the fine tuning while observing the signal and the TV screen so that the burst signal amplitude becomes approx. 0.3V ± 0.1 Vp-p. Also confirm that there is not spikes observed at the sync signal portion. (See Fig. 5-1.)

The video (colour bar) signal for the alignment is shown in Fig. 5-1.

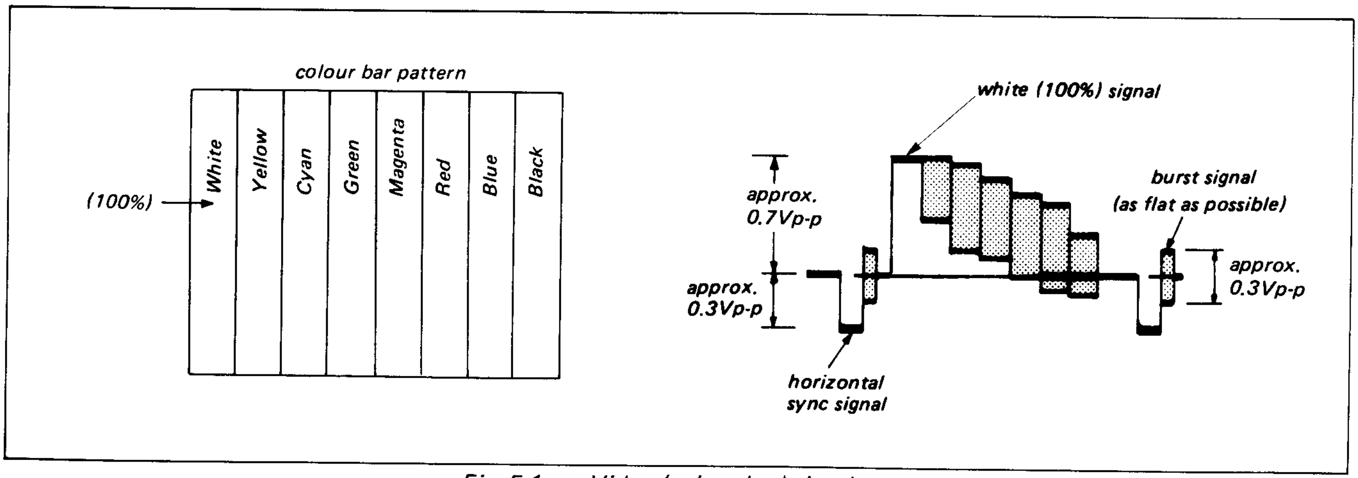


Fig. 5-1. Video (colour-bar) signal

[Alignment Tape]

KR5-2H

	Video signal	Audio signal	Playing time	Use for
1.	Colour bars	3 kHz - 5 dB	5 min	General performance, tape speed checks, switching position adjustment.
2.	Monoscope	333 Hz - 25 dB	5 min	Video head dihedral, audio level adjustment.
3.	RF sweep	5 kHz – 25 dB	5 min	Video, audio frequency characteristics, audio azimuth adjustment marker: 1, 2, 3.58, 4.5, 5.2 MHz
4.	Tracking 1 MHz (CH-B) *1 (Channel B is inserted in every 3 frames.)	1 kHz – 5 dB *2 (Signal is dropped out in the positions where channel B is inserted.)	5 min	Tracking, Audio height adjustments CTL Position check (Check if *1 and *2 are the same position.)

[Alignment Tool for Semi-fixed Variable Resistors and Coils]

Semi-fixed variable resistors and inductances should be adjusted with the alignment tool exclusively prepared for the adjustment of the components. A common screwdriver is too large for adjusting the components from the conductor side of a printed circuit board.

The metal blade of the alignment tool is used for variable resistors and trimmer capacitors and the plastic tip is used for variable inductances.

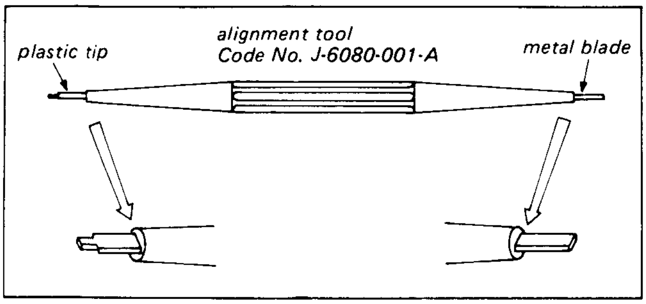

plastic tip
alignment tool
Code No. J-6080-001-A
metal blade

Fig. 5-2. Alignment tool

[Required levels and Impedances of Input and Output]

Video

Input VIDEO IN: BNC connector

$1\ \text{Vp-p}\ ^{+1.0}_{-0.5}\ \text{Vp-p}$

75Ω unbalanced, sync negative

VIDEO OUT: BNC connector

1 Vp-p ± 0.1 Vp-p

75Ω unbalanced, sync negative

Audio

Input AUDIO IN: phono jack

47 kΩ, −10 dBs

(0 dBs = 0.775V rms)

Output AUDIO OUT: phono jack

Load impedance less than 10 kΩ

−10 dBs with 47 kΩ load unbalanced

[Colour Bar Signal]

The 100% colour bar signal recorded on the Alignment tape is shown in Fig. 5-3.

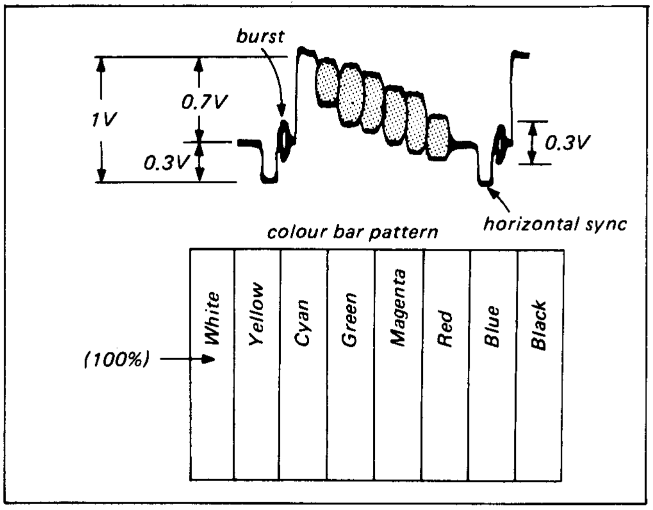
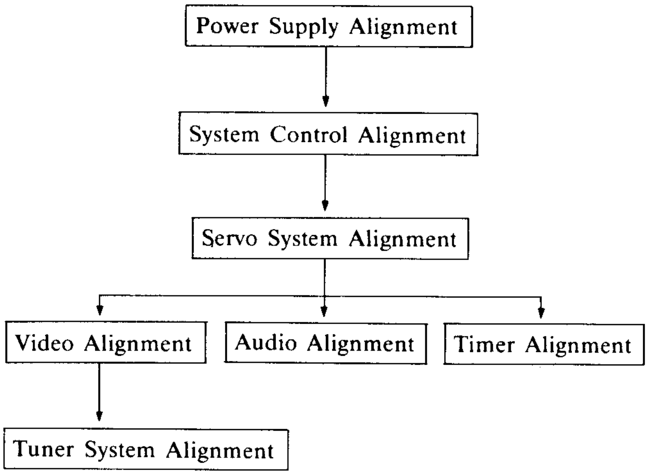

burst
1V
0.7V
0.3V
0.3V
colour bar pattern
horizontal sync
(100%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
Black

Fig. 5-3. Colour bar signal recorded on the alignment tape

[Adjustment procedure]

Adjust in the order given below.


Power Supply Alignment
System Control Alignment
Servo System Alignment
Video Alignment
Audio Alignment
Timer Alignment
Tuner System Alignment

5-1. POWER SUPPLY CHECK (PS-46 Board)

Measure in E-E mode (power supply switch ON).

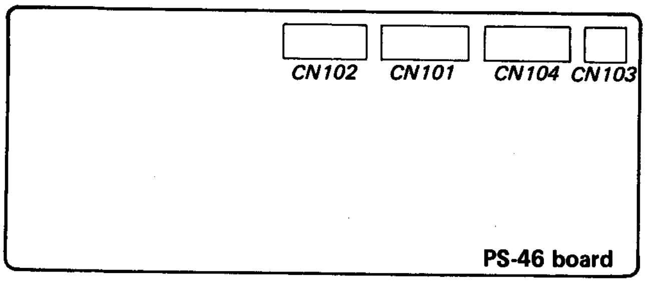


Fig. 5-4. Component layout

1. UN 12V Check
   Pin ⑥ of CN101 shall be 12 ± 0.5V
2. SW 12V Check
   Pin ③ of CN101 shall be 12.2 ± 0.2V
3. SW 9V Check
   Pin ⑤ of CN101 shall be 9.0 ± 0.2V
4. UN 5V Check
   Pin ① of CN101 shall be 5.1 ± 0.5V
5. UN 45V Check
   Pin ② of CN102 shall be 44 ± 3V
6. UN –45V Check
   Pin ③ of CN102 shall be –44 ± 3V

5-2. SYSTEM CONTROL CHECK (SS-34 Board)

1. Clock Frequency Check

Mode: E-E
Signal: None
Frequency counter: Pin (60) of IC601
Check: f: 6 MHz

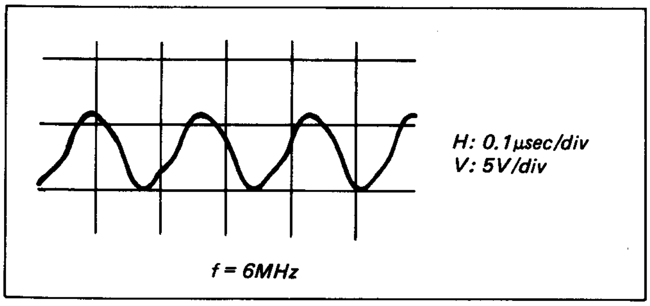


Fig. 5-5.

5-3. SERVO SYSTEM ALIGNMENT

Alignment Sequence

1. Drum servo system alignment
2. Capstan servo system alignment
3. STILL servo system alignment

5-3-1. Drum Servo System Alignment

1) Drum Free Speed Adjustment (SS-34 Board)
   Mode: Playback
   Signal: Alignment tape colour bar. or monoscope
   Oscilloscope: CH-1 TP405 (Pin ⑬ of IC301)
   CH-2 TP402 (Pin ㊴ of IC301)

[Alignment method]

Adjust to 553 μsec ± 10 μsec with RV303.

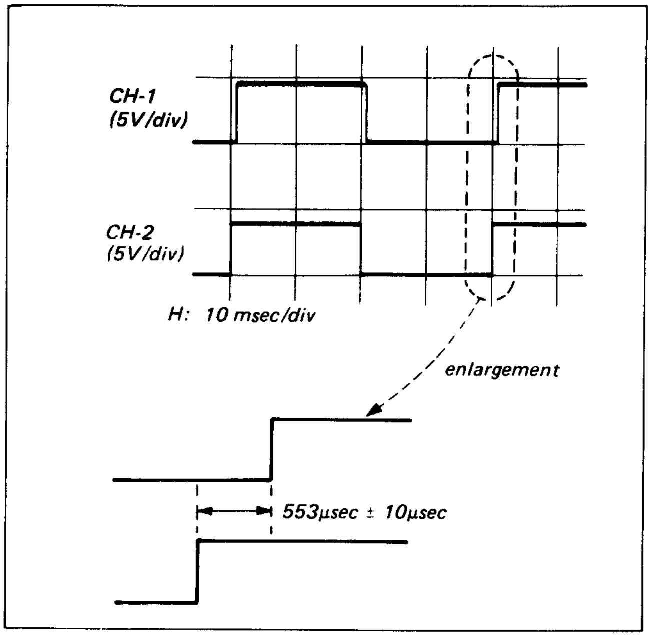


Fig. 5-6. Drum free speed adjustment

2) RF Switching Position Adjustment (SS-34 Board)
   Mode: Playback
   Signal: Alignment tape colour bar or monoscope
   Oscilloscope: CH-1 TP402 (Pin ㊴ of IC301)
   CH-2 Pin ㊵ of IC301

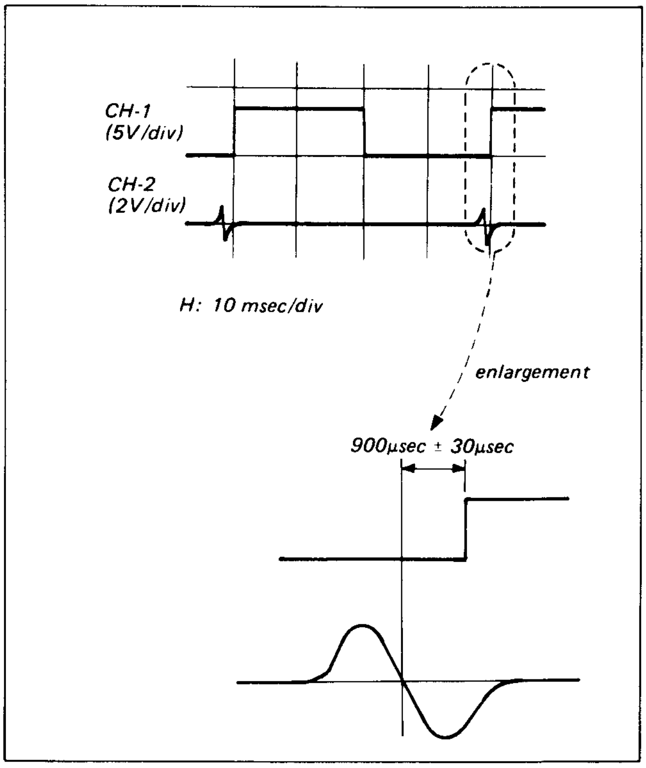


Fig. 5-7. RF switching position adjustment (1)

[Adjustment method]

i) Adjust to 900 µsec ± 30 µsec with RV304(See Fig. 5-7.)

ii) Change connection of CH-2 only to Pin ㉜ of IC301.

iii) Adjust to 900 µsec ± 30 µsec with RV305 (See Fig. 5-8.)

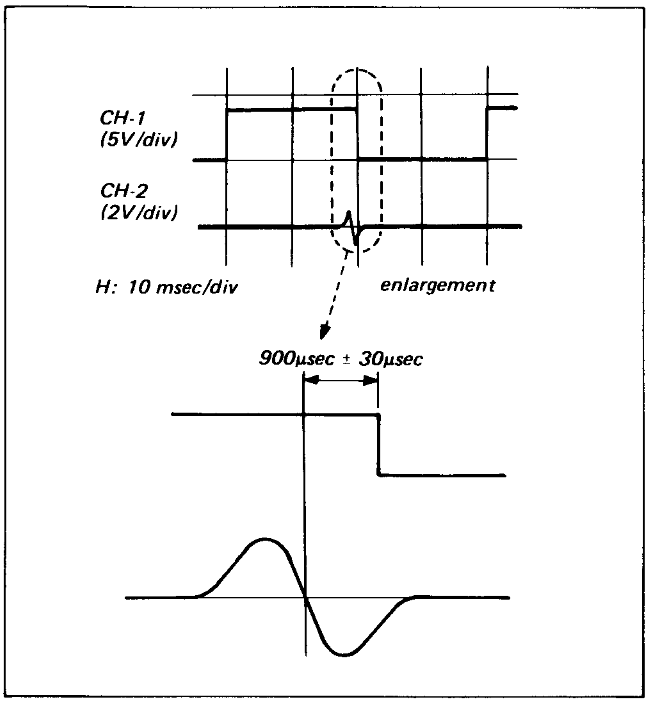


Fig. 5-8. RF switching position adjustment (2)

3) PICTURE SEARCH, f_H Adjustment (SS-34 Board)
Mode: PICTURE SEARCH (FWD)
Signal: Alignment tape colour bar or monoscope
Frequency counter: Pin ③ of CN309 (TP404)

[Adjustment method]

Adjust to 64 µsec ± 0.3 µsec with RV307.

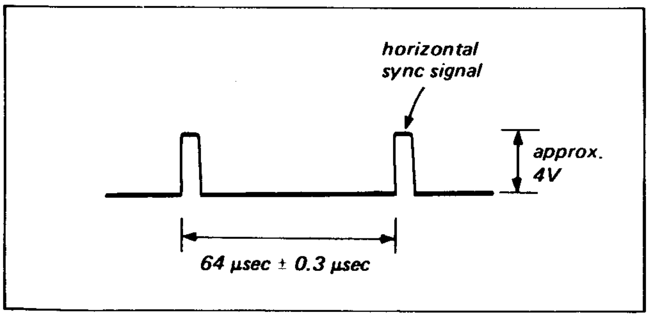


Fig. 5-9. PICTURE SEARCH, drum free speed adjustment

5-3-2. Capstan Servo System Alignment

1) Capstan Free Speed Adjustment (SS-34 Board)
Mode: playback
Signal: Alignment tape colour bar or monoscope
Oscilloscope: TP407 (Pin ⑳ of IC301)

[Adjustment method]

Adjust the duty (ratio for A and B) to 50% ± 5% with the RV301.

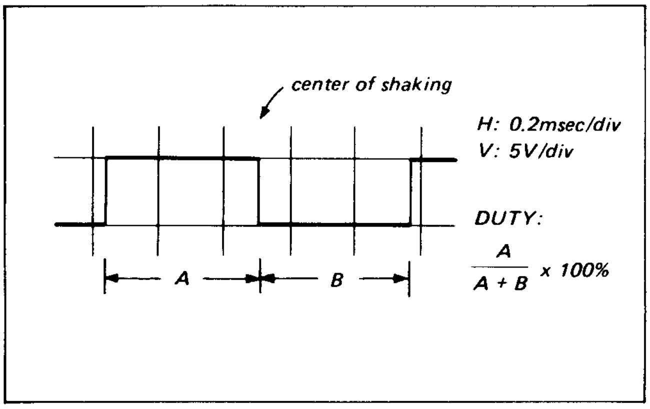


Fig. 5-10. Capstan free speed adjustment

2) PICTURE SEARCH, Capstan Free Speed Adjustment (SS-34 Board)
Mode: PICTURE SEARCH (FWD)
Signal: Alignment tape colour bar or monoscope

[Adjustment method]

i) Set up the picture search (forward) mode and adjust with RV302 so that the progression of noise bars becomes as slow as possible.

ii) Set up the picture search (reverse) mode and check that noise bars do not progress very quickly.

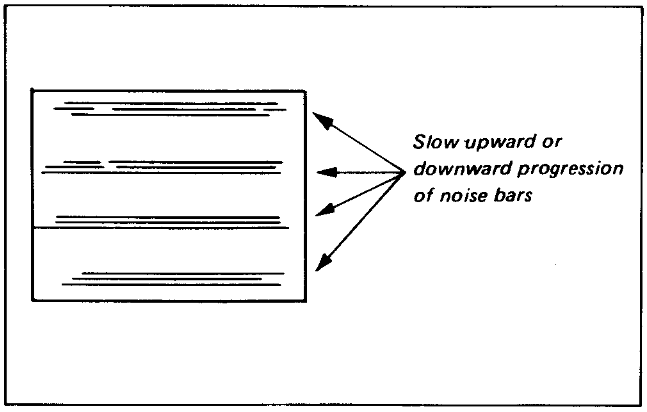


Fig. 5-11. PICTURE SEARCH, capstan free speed adjustment

3) Tracking Center Adjustment (SS-34 Board)
Mode: Playback
Signal: Alignment tape colour bar, or monoscope
Oscilloscope: CH-1 TP405 (Pin ⑬ of IC301)
CH-2 TP406 (Pin ⑮ of IC301)

[Adjustment method]

i) Set the TRACKING knob to the center click position.
ii) Adjust to 7.05 msec ± 0.05 msec with RV306.(See Fig. 5-12.)

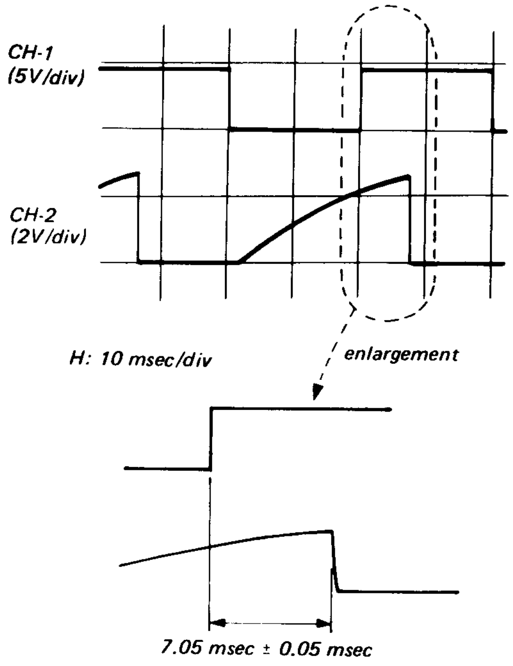

CH-1
(5V/div)
CH-2
(2V/div)
H: 10 msec/div
enlargement
7.05 msec ± 0.05 msec

Fig. 5-12. Tracking center adjustment

5-3-3. STILL Servo System Alignment

1) Capstan Brake Adjustment (SS-34 Board)
Mode: PB →PB · PAUSE
Signal: Alignment tape colour bar or monoscope
Oscilloscope: Pin ④ of CN303, ($\overline{\text{CAP RVS}}$)
External trigger: Pin ⑮ of IC305, ($\overline{\text{CAP CUT}}$)
Sweep mode: Normal
Trigger slope: – (minus)

[Adjustment method]

i) Adjust trigger level so the oscilloscope sweeps only when the VTR shifts from the PB mode to the PB PAUSE mode.
ii) Adjust to 16.7msec ±0.5msec with RV603.

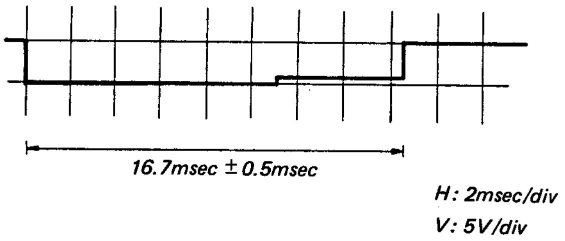

16.7msec ± 0.5msec
H: 2msec/div
V: 5V/div

Fig. 5-13. Capstan brake adjustment

2) STILL Tracking Adjustment (SS-34 Board)
Mode: PB →PB · PAUSE
Signal: Alignment tape colour bar or monoscope
Oscilloscope: CH-1: Pin ④ of CN303, ($\overline{\text{CAP RVS}}$)
CH-2: TP402, (RF SW PULSE)
External trigger: Pin ⑮ of IC305, ($\overline{\text{CAP CUT}}$)
Sweep mode: Normal
Trigger slope: – (minus)

[Adjustment method]

i) Adjust trigger level so the oscilloscope sweeps only when the VTR shifts from the PB mode to the PB PAUSE mode.
ii) Adjust to 2.9msec ±0.5msec with RV602.

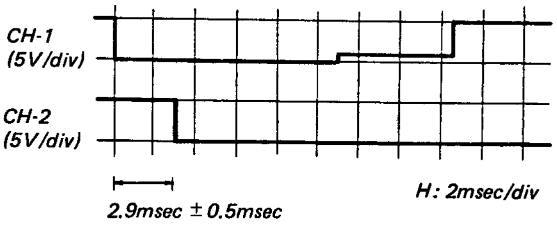

CH-1
(5V/div)
CH-2
(5V/div)
2.9msec ± 0.5msec
H: 2msec/div

Fig. 5-14. STILL tracking adjustment

3) STILL, f_H Adjustment (SS-34 Board)
Mode: PB · PAUSE (STILL)
Signal: Alignment tape colour bar or monoscope
Oscilloscope: Pin ③ of CN309 (TP404)

[Adjustment method]

i) Adjust to 64µsec ±0.1µsec with RV310.

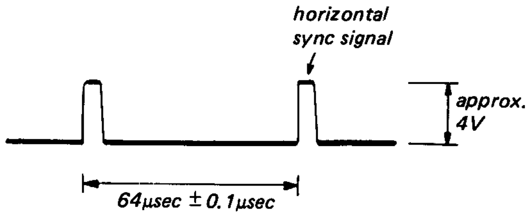

horizontal
sync signal
approx.
4V
64µsec ± 0.1µsec

Fig. 5-15. STILL, f_H Adjustment

5-4. PAL VIDEO SYSTEM ALIGNMENT

As a rule, first the playback system is aligned with an alignment tape to check that it operates normally, then the recording system is aligned.
The alignment sequence is shown below. The Y signal and chroma signal systems are aligned for both playback and recording systems.
Colour video signal supplied by the PAL colour bar generator is used as video input signal for video system alignment in the record mode. Check that the sync and colour burst signals conform to the specifications designated in "Set-up for Alignment" in Fig. 5-1.

5-4-1. Playback System Alignment

1. Playback frequency characteristic adjustment
2. Expand adjustment
3. Playback video level adjustment
4. Y-comb adjustment
5. Dropout compensator adjustment
6. AFC adjustment
7. AFC offset adjustment
8. 4.43MHz REF adjustment
9. Chroma comb filter adjustment
10. Carrier balance adjustment
11. JOG PLL adjustment
12. JOG exchange chroma level adjustment

5-4-2. Record System Alignment

1. Sync AGC adjustment
2. Compress adjustment
3. Carrier set adjustment
4. Deviation adjustment
5. Dark clip and white clip adjustment
6. Y record current adjustment
7. Pilot burst signal level adjustment
8. Chroma record current adjustment

5-4-1. Playback System Alignment

1) Playback Frequency Characteristic Adjustment (RP-20 Board)
   - Adjust both the A and B channels.
   - The B channel indicated by ( ).

   Mode: Playback
   Signal: Alignment tape RF sweep
   Oscilloscope: Pin ⑥ of CN502
   External trigger: Pin ③ of CN502

[Adjustment method]

i) Turn tracking knob to maximum output.
ii) Adjust RV503 to make the 2MHz amplitude of A and B channels equal. (See Fig. 5-16)
iii) Set the trigger slope to –(+).
iv) Adjust the 5.2MHz amplitude to 1/2 – 2/3 of the 2MHz amplitude with RV502 (RV501).

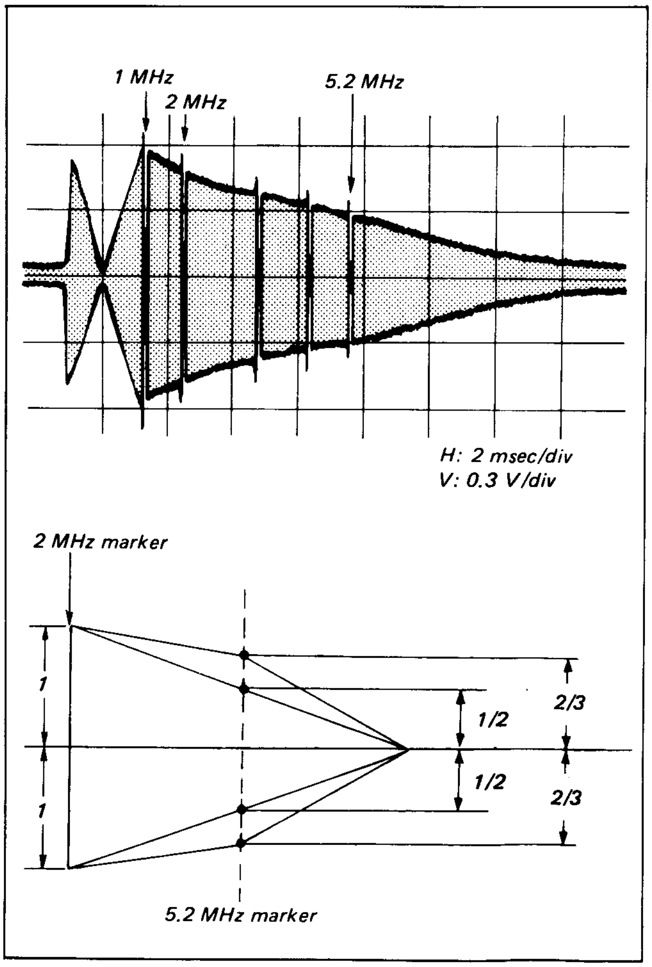


Fig. 5-16. Playback amplifier frequency characteristic adjustment

2) Expand Adjustment (YC-31 Board)
   Mode: Playback
   Signal: Colour bar
   Digital voltmeter: See Fig. 5-17.

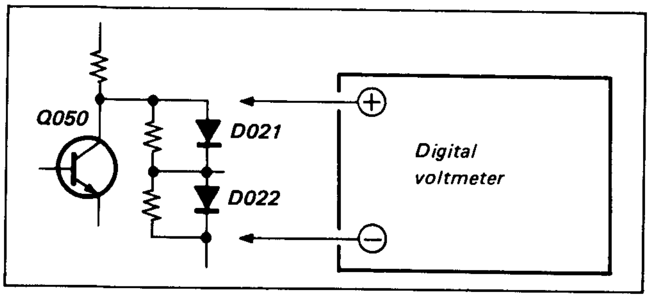


Fig. 5-17.

[Adjustment method]

i) Adjust to 0.45 ± 0.01 Vdc with RV020.

3) Playback Video Level Adjustment (YC-31 Board)

Mode:	Playback
Signal:	Alignment tape colour bar
Oscilloscope:	VIDEO OUT (75Ω terminated) on YC-31 Board

[Adjusment method]

i) Adjust to 1.0V ± 0.05Vp-p with RV019 on YC-31 Board.

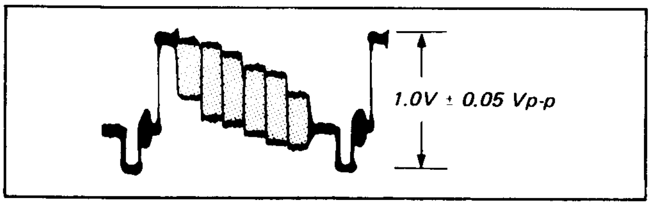


Fig. 5-18. Playback video level adjustment

4) Y-Comb Adjustment (YC-31 Board)

Mode:	Playback
Signal:	Colour bar
Oscilloscope:	Pin ⑧ of IC401 (Attach 100kΩ resistor to tip of probe (10:1)).

[Adjustment method]

i) Adjust RV401 for minimum output.

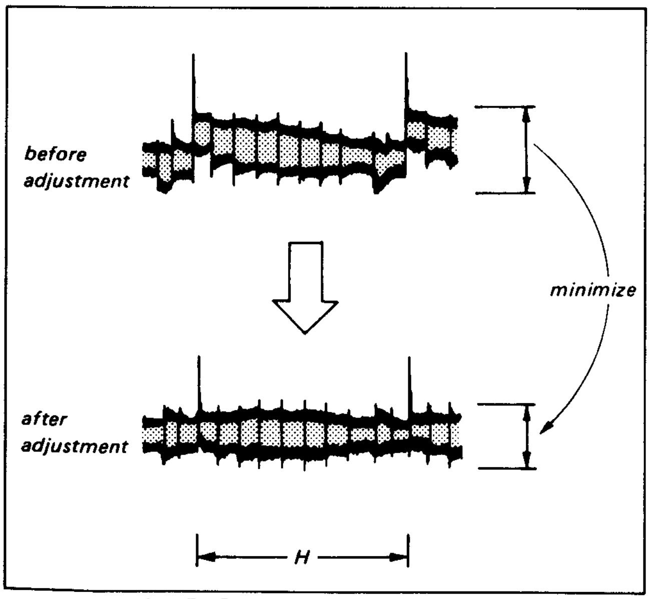


Fig. 5-19. Y-comb adjustment

5) Dropout Compensator Threshold Adjustment (YC-31 Board)

Mode:	Playback
Signal:	A recorded tape with dropouts

[Adjustment method]

i) Turn RV010 fully clockwise (↻) as seen from the pattern side. In this state, dropouts appear on the monitor screen.

ii) Slowly turn RV010 counterclockwise (↺) and set to make the dropouts disappear.

iii) Rewind the tape and verify that the dropouts described in (i) above have disappeared.

6) AFC Adjustment (YC-31 Board)

Mode:	E-E
Signal:	Colour bar
Oscilloscope:	Pin ㉖ of IC006

[Adjustment method]

i) Adjust to 4.50Vdc ± 0.01 Vdc with RV007.

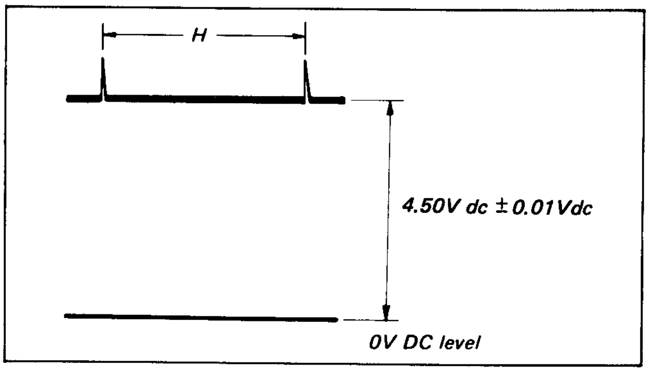


Fig. 5-20. AFC adjustment

7) AFC Offset Adjustment (YC-31 Board)

Mode:	Record
Signal:	Colour bar
Oscilloscope:	Pin ㉖ of IC006

[Adjustment method]

i) Adjust RV006 so that the fluctuation of DC level is minimum.

ii) After this adjustment, check the AFC adjustment.

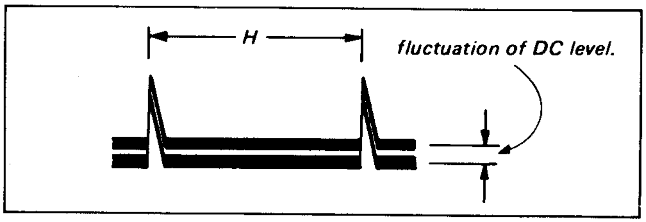


Fig. 5-21. AFC offest adjustment

8) 4.43MHz REF. adjustment (YC-31 Board)

Mode:	PB
Signal:	Colour bar
Frequency counter:	Pin ⑭ of IC006

[Adjustment method]

i) Adjust to 4.433619MHz ± 5 Hz with CV001.

9) Chroma Comb Filter Adjustment (YC-31 Board)
Mode: Playback
Signal: Alignment tape colour bar
Adjust while observing the monitor TV screen.

[Adjustment method]

i) Minimize beats with RV501 and LV501.

10) Carrier Balance Adjustment (YC-31 Board)
Mode: Playback
Signal: Alignment tape colour bar
Adjust while observing the monitor TV screen.

[Adjustment method]

i) Minimize beats with RV005.

11) JOG PLL Adjustment (YC-31 Board)
Mode: E-E
Signal: Colour bar
Oscilloscope: Pin ⑩ of IC003

[Adjustment method]

Adjust to 20μsec ±1μsec with RV003. (See Fig. 5-28.)

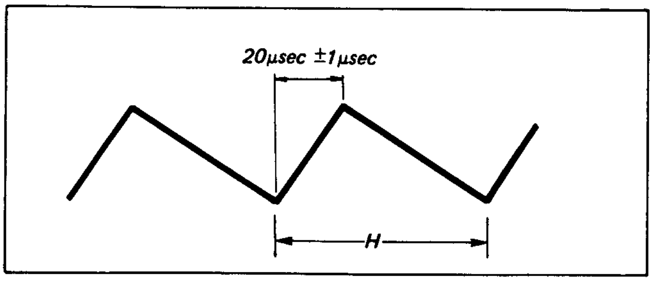


Fig. 5-22. JOG PLL adjustment

12) JOG Exchange Chroma level Adjustment (YC-31 Board)
Mode: PB • PAUSE (STILL)
Signal: colour bar
Oscilloscope: Pin ⑧ of IC003

[Adjustment method]

i) Adjust RV002 so that the fluctuation of level is minimum.

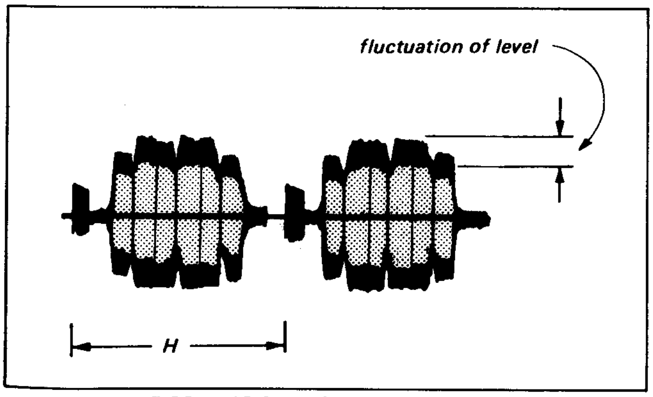


Fig. 5-23. JOG EXCH. C. level adjustment

5-4-2. Record System Alignment

1) Sync AGC Adjustment (YC-31 Board)
Mode: E-E
Oscilloscope: VIDEO OUT (75Ω terminated)
Signal: Colour bar (V : S = 7 : 3)

[Adjustment method]

i) Adjust to 1.0V ±0.05Vp-p with RV021.

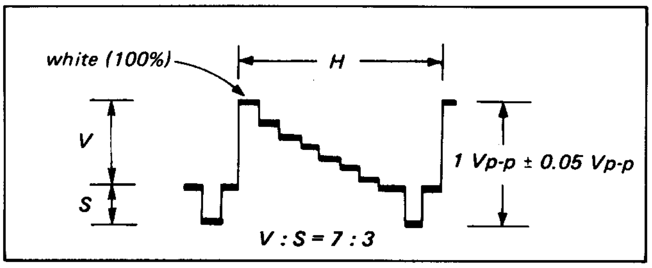


Fig. 5-24. Sync AGC adjustment

2) Compress Adjustment (YC-31 Board)
Mode: E-E
Signal: None
Digital voltmeter: See Fig. 5-25.

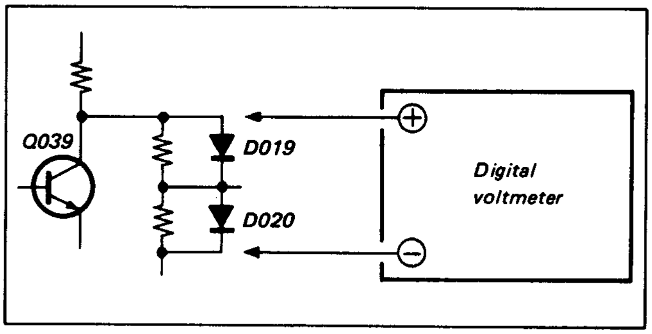


Fig. 5-25.

[Adjustment method]

i) Adjust to 0.3V ± 0.01 Vdc with RV016.

3) Carrier Set Adjustment (YC-31 Board)
Mode: E-E
Signal: None
Frequency counter: Pin ㉕ of IC009

[Adjustment method]

1) Adjust to 3.8MHz ±0.04MHz with RV014.

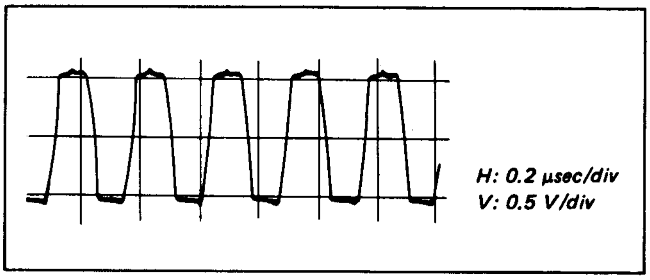


Fig. 5-26. Carrier set adjustment

4) Deviation Adjustment (YC-31 Board)

- The playback system adjustment and the carrier set adjustment in Paragraph 3) above must be completed before making this adjustment.

Mode: Self-recording and playback
Signal: Colour bar
Oscilloscope: Collector of Q038, VIDEO OUT (75Ω terminated)

[Adjustment method]

i) Supply the colour bar signal and set up E-E mode.
ii) Connect the oscilloscope to Collector of Q038.
iii) Adjust the Y signal level to 0.4Vp-p with RV015.
iv) Set up RECORD mode.
v) Playback the recorded section of the tape.
vi) Connect the oscilloscope to VIDEO OUT.
vii) Check that the video signal level is 1.0 Vp-p ± 0.05 Vp-p. if the level is outside of this range, repeat Steps iv) through vi) above adjusting with RV015 until the standard value is obtained.

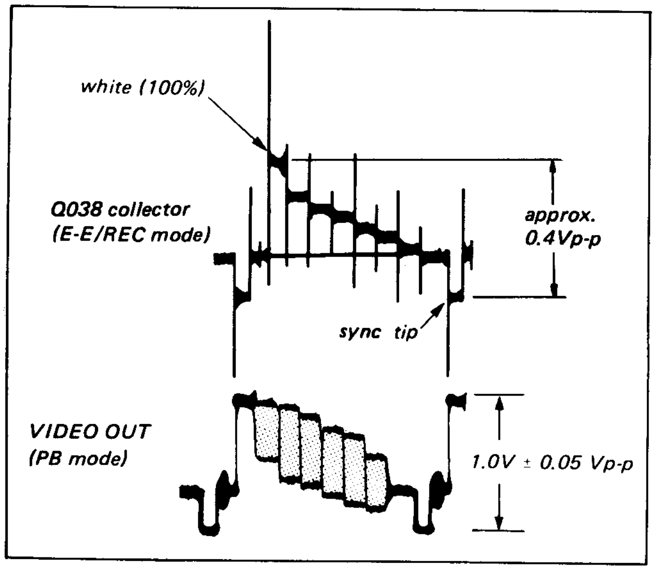


Fig. 5-27. Deviation adjustment

5) Dark Clip and White Clip Adjustment (YC-31 Board)
Mode: E-E
Signal: None
Frequency counter: Pin ㉕ of IC009

[Adjustment method]

i) Connect a jumper wire between the base of Q041 and ground.
ii) Adjust to 2.82MHz ±0.1MHz with RV012.
iii) Check that the voltage of the collector of Q038 is 1.5V ±0.3V dc.
iv) Remove the jumper wire.
v) Connect a jumper wire between the base of Q041 and the 9V line (collector of Q042).
vi) Adjust to 6.66MHz ±0.1MHz with RV013.
vii) Remove the jumper wire.

6) Y Record Current Adjustment(YC-31Board)
Mode: Record
Signal: Colour bar
Oscilloscope: Pin ⑤ of CN002

[Adjustment method]

i) Adjust to 450mV ±20mVp-p with RV602.

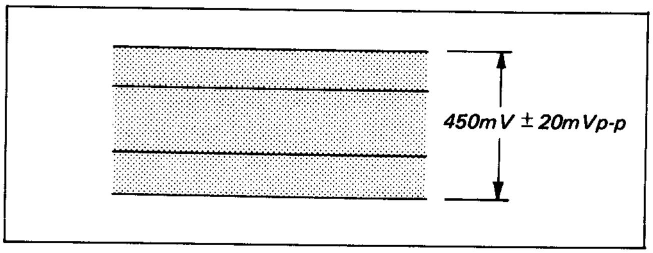


Fig. 5-28. Y record current adjustment

7) Pilot Burst Signal Level Adjustment (YC-31 Board)
Mode: E-E
Signal: Colour bar
Oscilloscope: Pin ① of IC006

[Adjustment method]

i) Align the pilot burst signal with the chroma signal level using RV009.

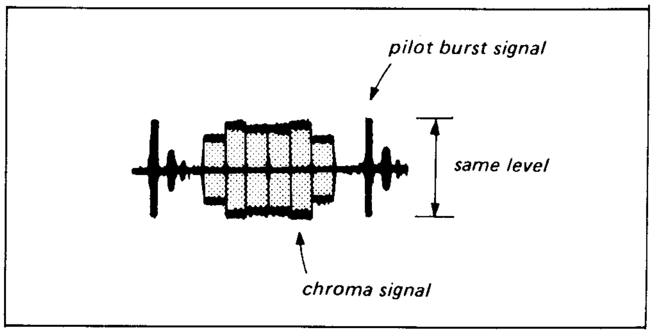


Fig. 5-29. Pilot burst signal level adjustment

8) Chroma Record Current Adjustment (YC-31 Board)
Mode: E-E
Signal: Colour bar
Oscilloscope: Pin ⑦ of CN002

[Adjustment method]

i) Adjust to 180mV ±10mVp-p with RV008.

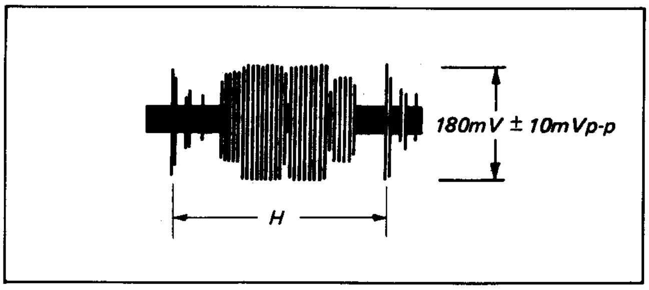


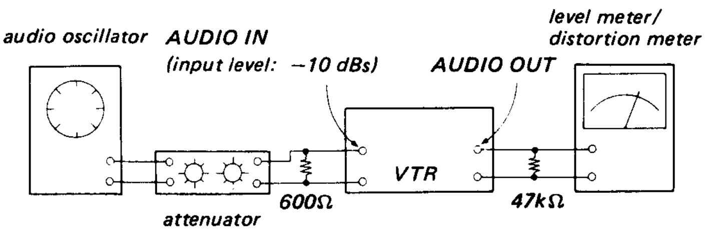
Fig. 5-30. Chroma record current adjustment

5-5. AUDIO SYSTEM ADJUSTMENT (TA-22 Board)

Use a Dynamicron tape for adjustments.

[Connection of Related Equipment]

Note: Set the INPUT SELECT switch to LINE.
Set the TONE switch to HIGH.



[Adjustment method]

1. ACE head adjustment... See "Mechanical Adjustment"
2. Playback frequency characteristic check
3. Playback output level adjustment
4. Bias oscillator check
5. Record bias adjustment
6. Record level check
7. Overall frequency characteristic check
8. Overall S/N check
9. Overall distortion check

1. ACE Head Adjustment

Refer to "Mechanical Adjustment"

2. Playback Frequency Characteristic Check

(1) Play back 333 Hz and 5 kHz from the alignment tape and check that the level difference between 333Hz and 5kHz is within 0dB ±1dB.

3. Playback Output Level Adjustment

(1) Play back 333 Hz from the alignment tape and adjust so that the output level is −30 dBs ± 0.5 dB with RV301.

4. Bias Oscillator Check

(1) Set the input signal level to zero and set up the RECORD mode.
(2) Connect a frequency counter to Pin ② of CN303. The reading should be 65kHz ±6.5kHz.

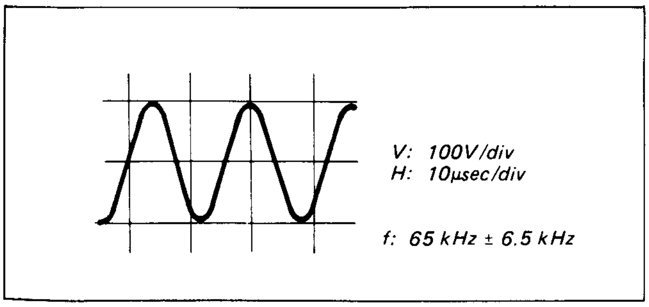


Fig. 5-31. Bias oscillator check

5. Record Bias Adjustment

Check that "Playback frequency characteristic check has been made.

(1) Connect TP301 and TP306 (GND) with a jumper wire so as to turn off the AGC operation.
(2) Supply a 333 Hz signal.
(3) Set up the E-E mode and adjust the oscillator output level so that the level meter reading is −30 dBs.
(4) Record signals.
(5) Supply a frequency of 7 kHz and perform Steps (3) and (4) above.
(6) Play back the recorded section of the tape and check that the output level at 7 kHz is ±1 dB relative to the output level at 333 Hz. If the level is outside this range, repeat Steps (2) through (5) adjusting with RV331 until the standard is met.
(7) Remove the jumper wire after making the adjustment.

6. Record Level Check

(1) Supply a 333Hz signal at −10dBs.
(2) Set up the E-E mode.
(3) Check that the output level is −10dBs ±3dB.
(4) Record signals.
(5) Play back the recorded section of the tape and check that the output level is −9dBs ±3dB.

7. Overall Frequency Characteristic Check

(1) Connect TP301 and TP306 (GND) with a jumper wire so as to turn off the AGC operation.
(2) Connect a 333 Hz signal.
(3) Set up the E-E mode and adjust the oscillator output level so that the level meter reading is −30 dBs.
(4) Record signals.
(5) Change the frequency to 50 Hz, 100 Hz, 7 kHz and 10 kHz and repeat Steps (3) and (4).
(6) Play back the recorded section of the tape and verify that the level is within the specification.

Standard values: With reference to the 333 Hz playback output level.

50 Hz $^{+2.5}_{-10}$ dB

100 Hz $^{+2.5}_{-3}$ dB

7 kHz $^{+2.5}_{-2.5}$ dB

10 kHz $^{+2.5}_{-6}$ dB

(7) If the specified values cannot be attained, perform 5 again. "Record Bias Adjustment".
(8) Remove the jumper wire after making the adjustment.

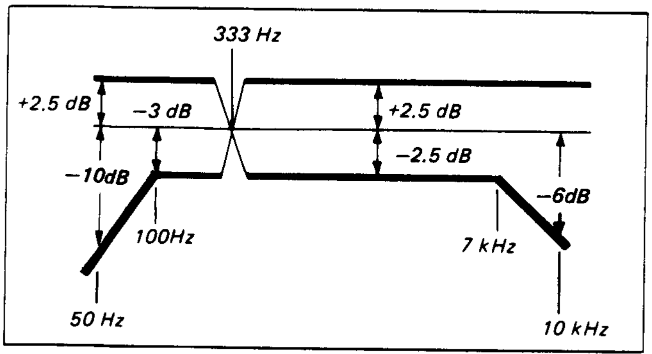


Fig. 5-32. Overall frequency characteristic

8. Overall S/N Check

(1) Supply a 333 Hz signal at −10 dBs.

(2) Record signals.

(3) Set the input signal level to zero and record signals.

(4) Play back the recorded section of the tape and check that the output level difference is greater than 38 dB.

9. Overall Distortion Check

(1) Supply a 333 Hz signal at −10 dBs.

(2) Record signals.

(3) Play back the recorded section of the tape and verify that the distortion is below 4%.

5-6. TUNER SYSTEM ADJUSTMENT (TA-22 Board)

1) Tuner AGC Adjustment

(1) Set the DX/LOCAL switch on the rear panel to DX.

(2) Input RF signals (West germany model: 52dBμ/75Ω terminated, other models: 55dBμ/75Ω terminated) from a colour bar generator, etc.

(3) Connect a digital voltmeter to TP001 (Pin ④ of IC001).

(4) Adjust RV001 to 7.2V ± 0.1V dc.

2) AFT Adjustment

(1) Input RF signals, and press FINE + or FINE − button finely for the best picture quality, while watching the monitor screen.

(2) Connect a digital voltmeter to pin ⑤ of IC001.

(3) Adjust T005 to 6V dc.

(4) Press AFT button to turn on the AFT operation, receive each channel and check to make sure that there is no beat or picture disturbance.

5-7. TIMER SYSTEM ADJUSTMENT (TM-57 Board)

1) Clock Adjustment

(1) Connect a frequency counter to pin (63) of IC001.

(2) Adjust oscillation period (T) with TC001 so the value will be as follows.

$T = (30.51750 + 0.000015 \times Cp)\mu sec \pm 0.0001 \mu sec$

Cp: Probe capacity (PF) of the frequency counter

2) System Clock Adjustment

(1) Connect a frequency counter to pin ㉖ of IC001.

(2) Adjust oscillation frequency (f) to the following value with RV001.

$f = (2.60 - 0.0041 \times Cp)MHz \pm 0.05MHz$

Cp: Probe capacity (PF) of the frequency counter

5-8. SECAM VIDEO SYSTEM ALIGNMENT

- Make this adjustment after aligning the PAL video system.
- For this adjustment, use the equipment listed below in conjunction with an alignment tape and SECAM colour bar signals.

[Equipment Required]

1. SECAM Colour Monitor TV
2. Oscilloscope, Dual-trace, Bandwidth ... more than 10 MHz with delay mode
3. SECAM Colour-Bar Generator
4. Alignment Tape, Type: KR5-1J, Code No. 8-969-996-03

[Setup for Alignment]

In this alignment, video signals obtained from the pattern generator will be used as alignment signals. Therefore, the video output signals should be within the specifications. Verify video signals by connecting an oscilloscope to VIDEO OUT connector (75Ω terminated). Check that the video signals are flat when the amplitude of the horizontal sync signal is about 0.3 Vp-p, the amplitude of the video portion is about 0.7 Vp-p, and the amplitude of the burst signal is about 0.3 Vp-p.
The video signal (colour-bar signal) used in this alignment is shown in Fig. 5-33.

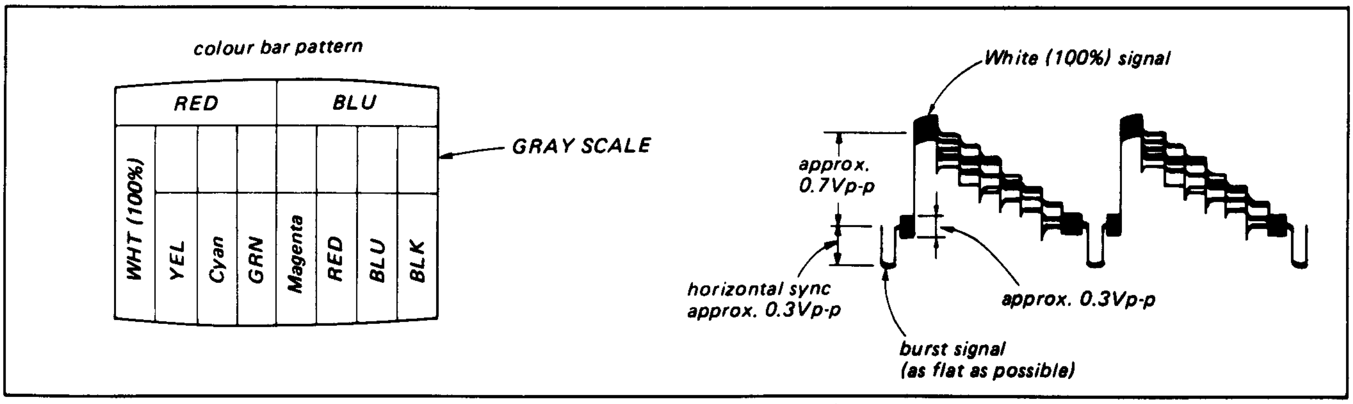

colour bar pattern
RED
BLU
GRAY SCALE
WHT (100%)
YEL
Cyan
GRN
Magenta
RED
BLU
BLK
White (100%) signal
approx. 0.7Vp-p
horizontal sync approx. 0.3Vp-p
approx. 0.3Vp-p
burst signal (as flat as possible)

Fig. 5-33. SECAM video (colour bar) signal

[Alignment Tape]
KR5-1J

	Video signal	Audio signal	Playing time	Use for
1.	Colour bars	3 kHz – 5 dB	5 min	General performance, tape speed checks, switching position adjustment.
2.	Monoscope	333 Hz – 25 dB	5 min	Video head dihedral, audio level adjustment.
3.	RF sweep	5 kHz – 25 dB	5 min	Video, audio frequency characteristics, audio azimuth adjustment marker: 1, 2, 3.58, 4.5, 5.2 MHz
4.	Tracking 1 MHz (CH-A) *1 (Channel B is inserted in every 3 frames.)	1 kHz – 5 dB *2 (Signal is dropped out in the positions where channel B is inserted.)	5 min	Tracking, Audio height adjustments CTL Position check (Check if *1 and *2 are the same position.)

[Colour Bar Signal]

The 100% colour bar signal recorded on the Alignment tape is shown in Fig. 5-34.

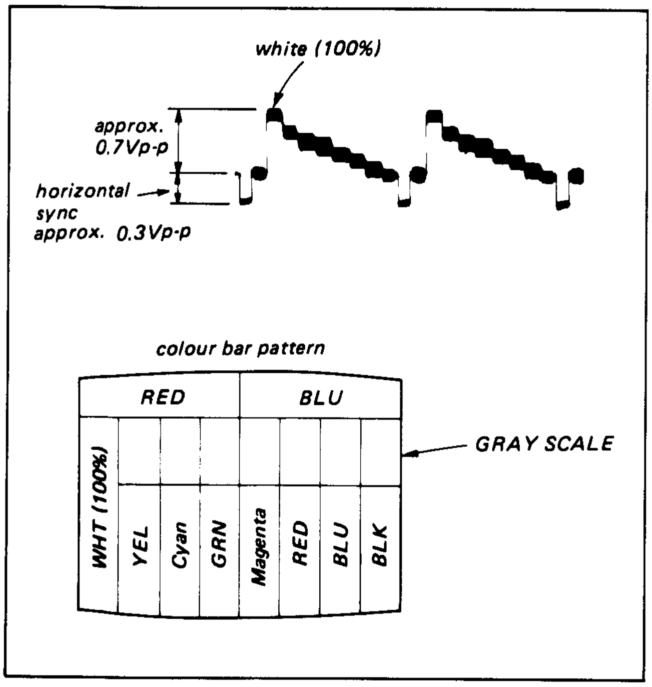

white (100%)
approx. 0.7Vp-p
horizontal sync approx. 0.3Vp-p
colour bar pattern
RED
BLU
GRAY SCALE
WHT (100%)
YEL
Cyan
GRN
Magenta
RED
BLU
BLK

Fig. 5-34. Colour bar signal recorded on the alignment tape

1) Bell Filter Adjustment (YC-31 Board)
Mode: E-E
Signal: SECAM colour bar
Oscilloscope: Pin ⑦ of CN002

[Adjustment method]

i) Adjust LV003 until the waveform is flat.

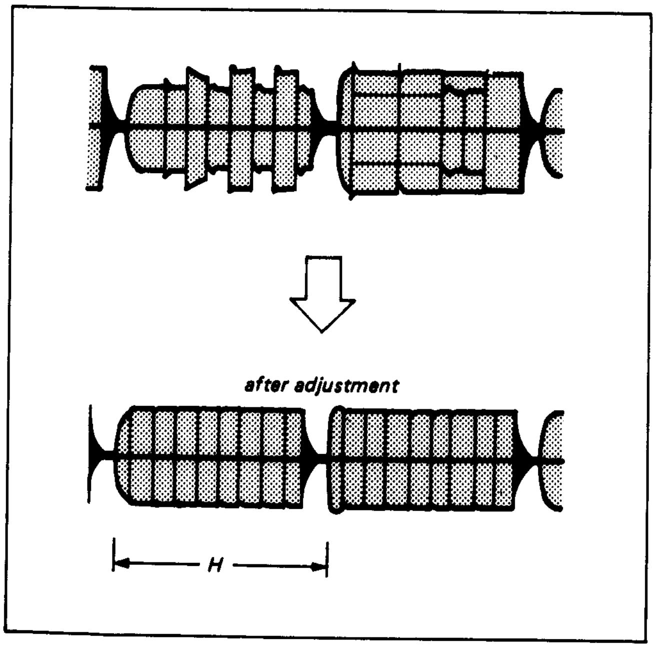

after adjustment
H

Fig. 5-35. Bell filter adjustment

2) SECAM ACK Adjustment (YC-31 Board)
Mode: E-E
Signal: SECAM colour bar
Oscilloscope: Pin ⑨ of IC002

[Adjustment method]

i) Adjust LV001 until the amplitude is a maximum.
ii) Adjust RV001 to 4.0V ±0.2Vp-p.

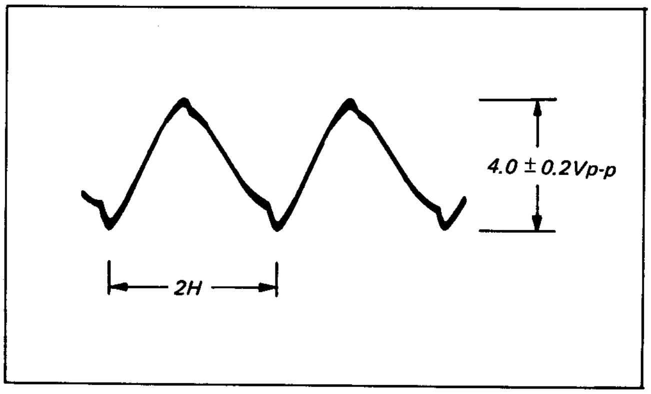


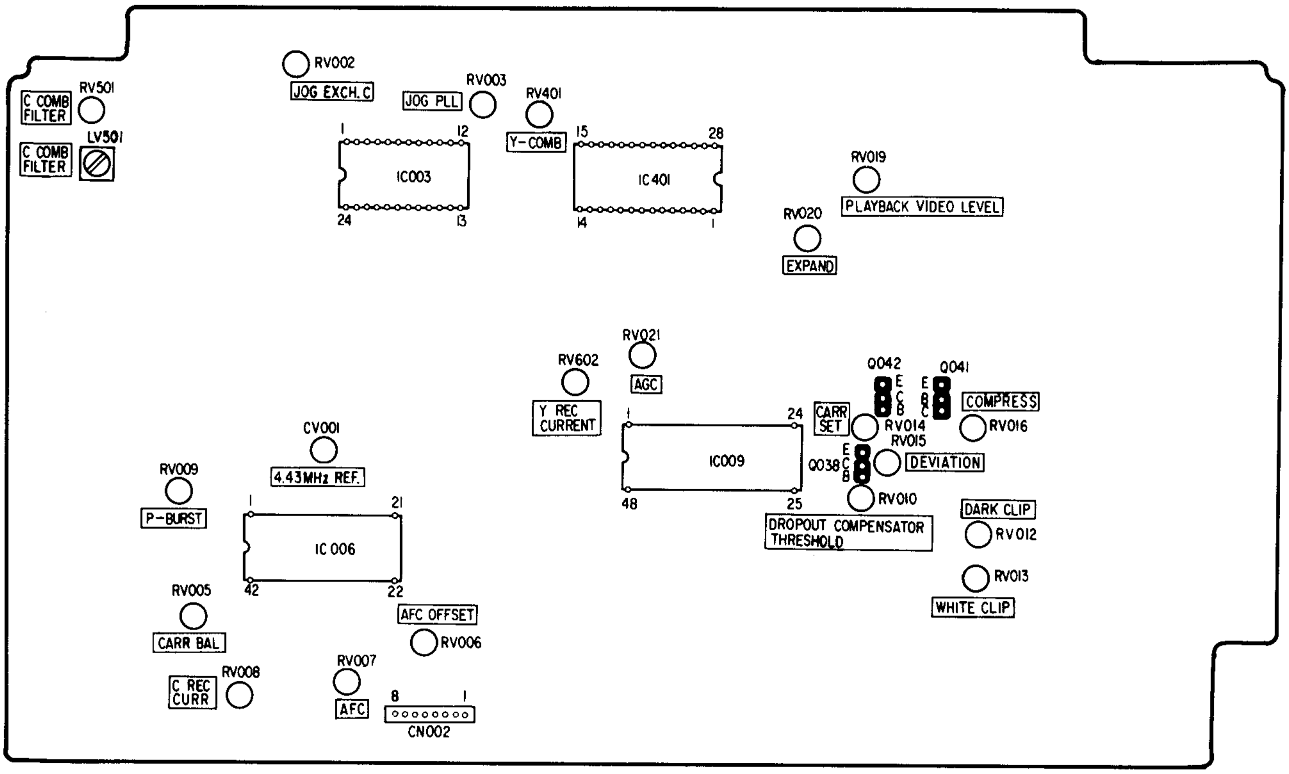
Fig. 5-36. SECAM ACK adjustment

3) Counter Bell Filter Adjustment (YC-31 Board)
Mode: Self-recording and playback
Signal: SECAM colour bar
Adjust while observing the monitor TV screen.

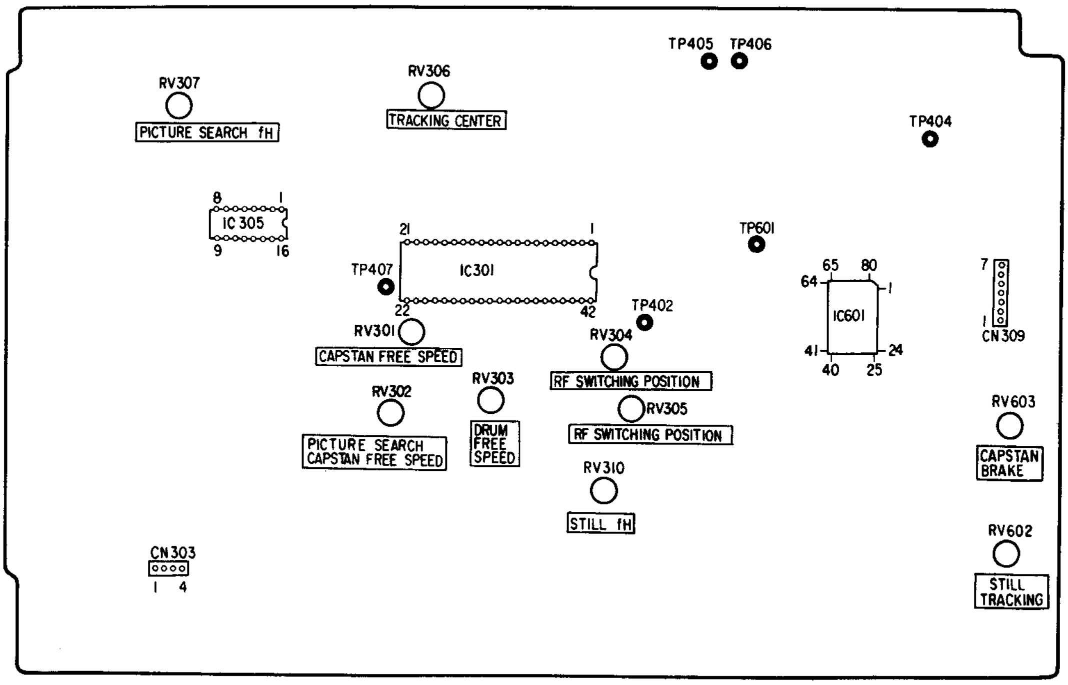
[Adjustment method]

i) Record SECAM colour bar signals.
ii) Playback the recorded signals.
iii) While observing the monitor TV screen, adjust LV002. until the border between the red and blue areas is at its cleanest (minimum beats).

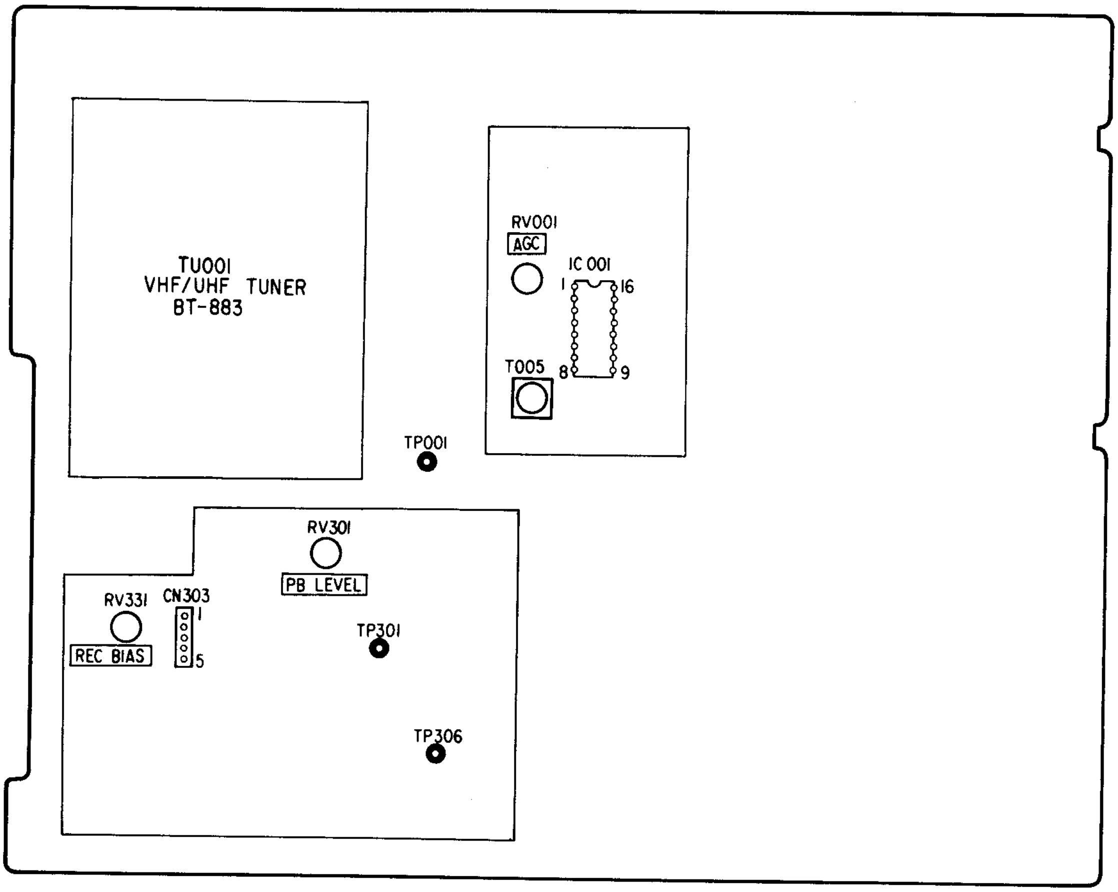
YC-31 BOARD (CONDUCTOR SIDE)


RV002
JOG EXCH.C
RV003
JOG PLL
RV401
Y-COMB
RV501
C COMB FILTER
LV501
C COMB FILTER
IC003
1
12
24
13
IC401
15
28
14
1
RV019
PLAYBACK VIDEO LEVEL
RV020
EXPAND
RV021
AGC
RV602
Y REC CURRENT
IC009
1
24
48
25
Q042
Q041
E
C
B
COMPRESS
CARR SET
RV014
RV016
RV015
DEVIATION
Q038
RV010
DROPOUT COMPENSATOR THRESHOLD
DARK CLIP
RV012
RV013
WHITE CLIP
CV001
4.43MHz REF.
RV009
P-BURST
IC 006
1
21
42
22
RV005
CARR BAL
AFC OFFSET
RV006
RV008
C REC CURR
RV007
AFC
8
1
CN002

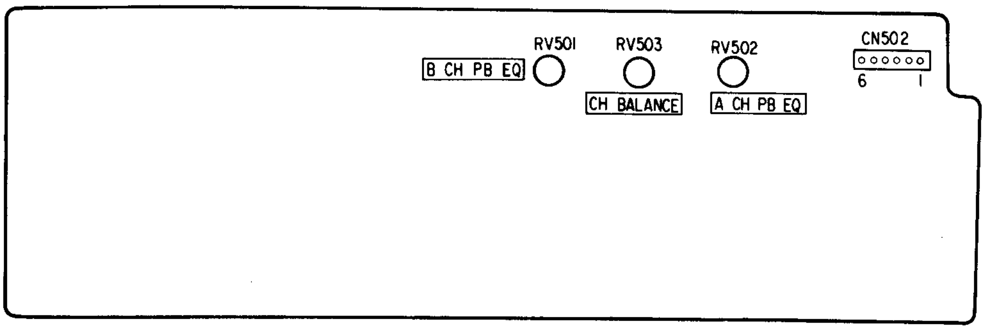
SS-34 BOARD (COMPONENT SIDE)


RV307
PICTURE SEARCH fH
RV306
TRACKING CENTER
TP405
TP406
TP404
IC 305
8
1
9
16
IC301
21
1
22
42
TP601
TP407
TP402
RV301
CAPSTAN FREE SPEED
RV304
RF SWITCHING POSITION
RV302
PICTURE SEARCH CAPSTAN FREE SPEED
RV303
DRUM FREE SPEED
RV305
RF SWITCHING POSITION
RV310
STILL fH
IC601
65
80
64
1
41
24
40
25
7
1
CN309
RV603
CAPSTAN BRAKE
RV602
STILL TRACKING
CN303
1
4

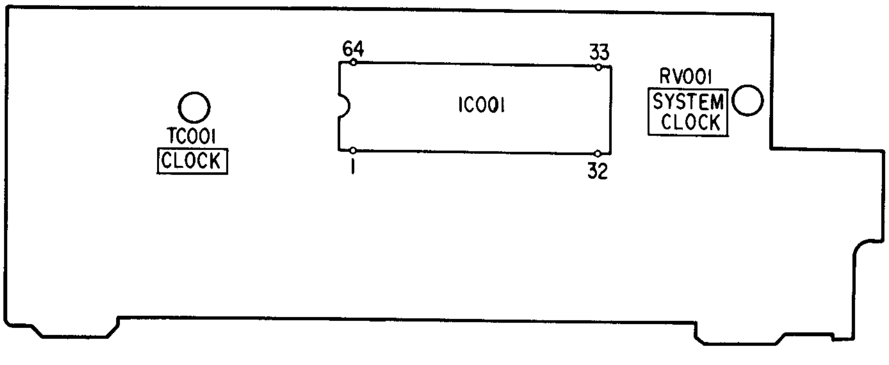
TA-22 BOARD (COMPONENT SIDE)


TU001
VHF/UHF TUNER
BT-883
RV001
AGC
IC 001
1
16
8
9
T005
TP001
RV301
PB LEVEL
RV331
CN303
1
5
REC BIAS
TP301
TP306

RP-20 BOARD (COMPONENT SIDE)

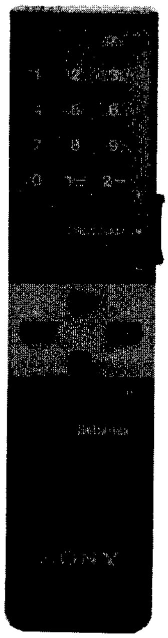

RV501
B CH PB EQ
RV503
CH BALANCE
RV502
A CH PB EQ
CN502
6
1

TM-57 BOARD (COMPONENT SIDE)


64
33
IC001
1
32
TC001
CLOCK
RV001
SYSTEM CLOCK

RMT-231

SERVICE MANUAL

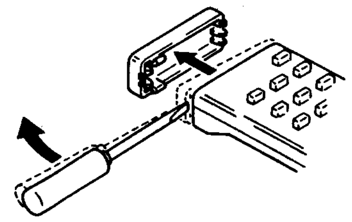


SPECIFICATIONS

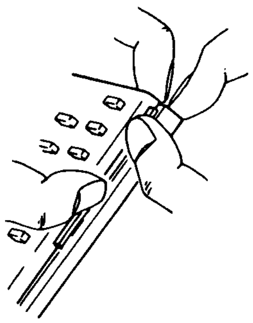
Remote Commander RMT-231

Remote control system	Infrared control
Power requirements	3V DC, 2 IEC designation R6 batteries (size AA)
Dimensions	Approx. 45 × 20 × 175 mm (w/h/d) (1¾ × ¾ × 7 inches) incl. projecting parts and controls
Weight	Approx. 105 g (3.7 oz) incl. batteries

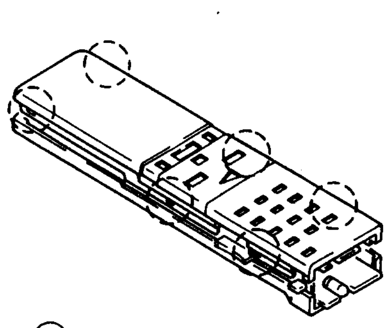
Disassembly



① Remove the front panel by prying up with a screwdriver.



② While pulling the lower case outward, lift the upper case and free the claw.



③ Free all 6 claws similarly.

REMOTE COMMANDER

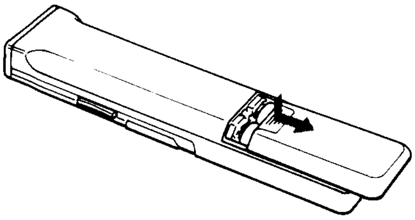
SONY®

1. REMOTE CONTROL OPERATION

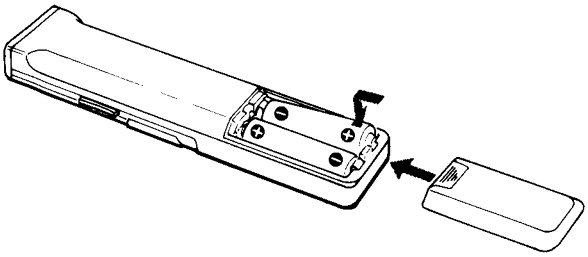
You can control almost all the functions of this video cassette recorder from your armchair using the supplied Remote Commander.

BATTERY INSERTION

1 Open the lid.



2 Insert two IEC designation R6 batteries with correct polarity.



3 Close the lid firmly.

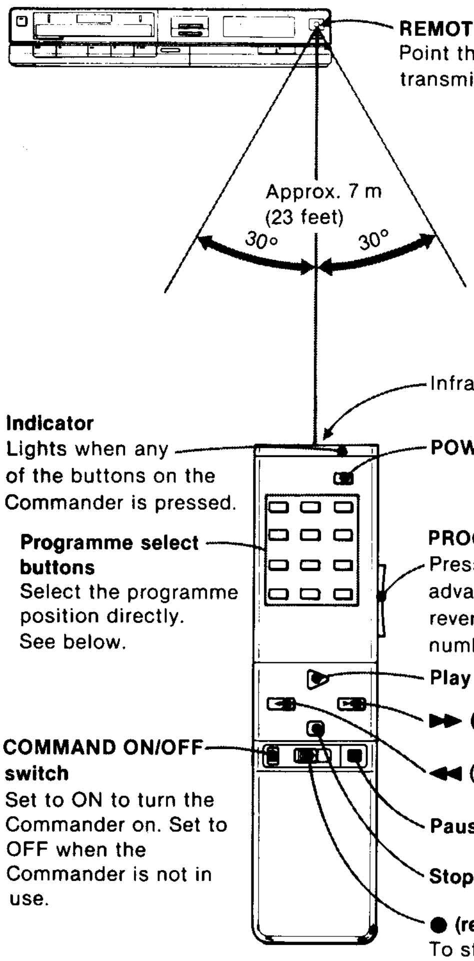
Battery life
In normal operation, batteries will last for about six months. If the range of the Remote Commander becomes noticeably short, replace the batteries with new ones. When the batteries are exhausted, the remote function indicator will not light when the buttons on the Commander are pressed.

If the Commander is not to be used for a long period of time, remove the batteries to avoid possible damage from battery leakage.

Notes

- There should be no obstacles between the Commander and the REMOTE SENSOR of the recorder.
- The shorter the distance between the Commander and the recorder, the wider the angle within which the recorder can be controlled.

OPERATION



REMOTE SENSOR
Point the infrared transmitter here.

Infrared transmitter

Indicator
Lights when any of the buttons on the Commander is pressed.

POWER button

Programme select buttons
Select the programme position directly.
See below.

PROGRAM scan button
Press the + side to advance or the – side to reverse the programme numbers.

Play button

▶▶ (fast-forward) button

◀◀ (rewind) button

COMMAND ON/OFF switch
Set to ON to turn the Commander on. Set to OFF when the Commander is not in use.

Pause button

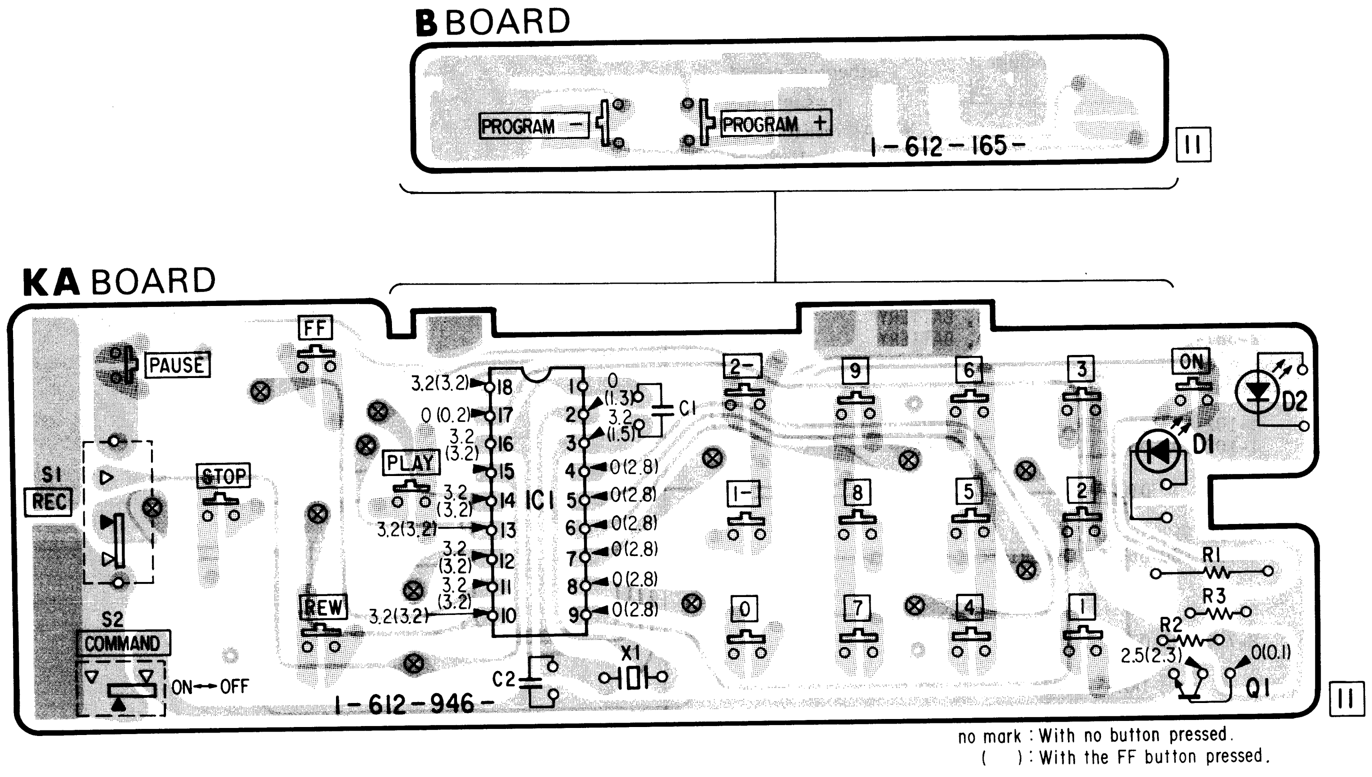
Stop button

● (record) button
To start recording, slide to the right.

How to press the programme select buttons
For programmes 1 through 9, press the corresponding single-digit button.
For 10 through 19, press "1-" for the tens-digit and then the corresponding single-digit button.
For 20 through 29, press "2-" and then the corresponding single-digit button.
For 30, press "0".
● If your do not press a single-digit button within several seconds after pressing "1-" or "2-", the previous programme position will be recalled.

2. PRINTED WIRING BOARDS

– Conductor Side –


B BOARD
PROGRAM –
PROGRAM +
1-612-165-
11
KA BOARD
PAUSE
FF
S1
REC
STOP
PLAY
REW
S2
COMMAND
ON←→OFF
IC1
3.2(3.2)
0 (0.2)
3.2 (3.2)
0 (1.3)
3.2 (1.5)
0 (2.8)
C1
C2
X1
2–
9
6
3
ON
D2
D1
1–
8
5
2
0
7
4
1
R1
R3
R2
2.5(2.3)
0(0.1)
Q1
1-612-946-
11

no mark : With no button pressed.
( ) : With the FF button pressed.

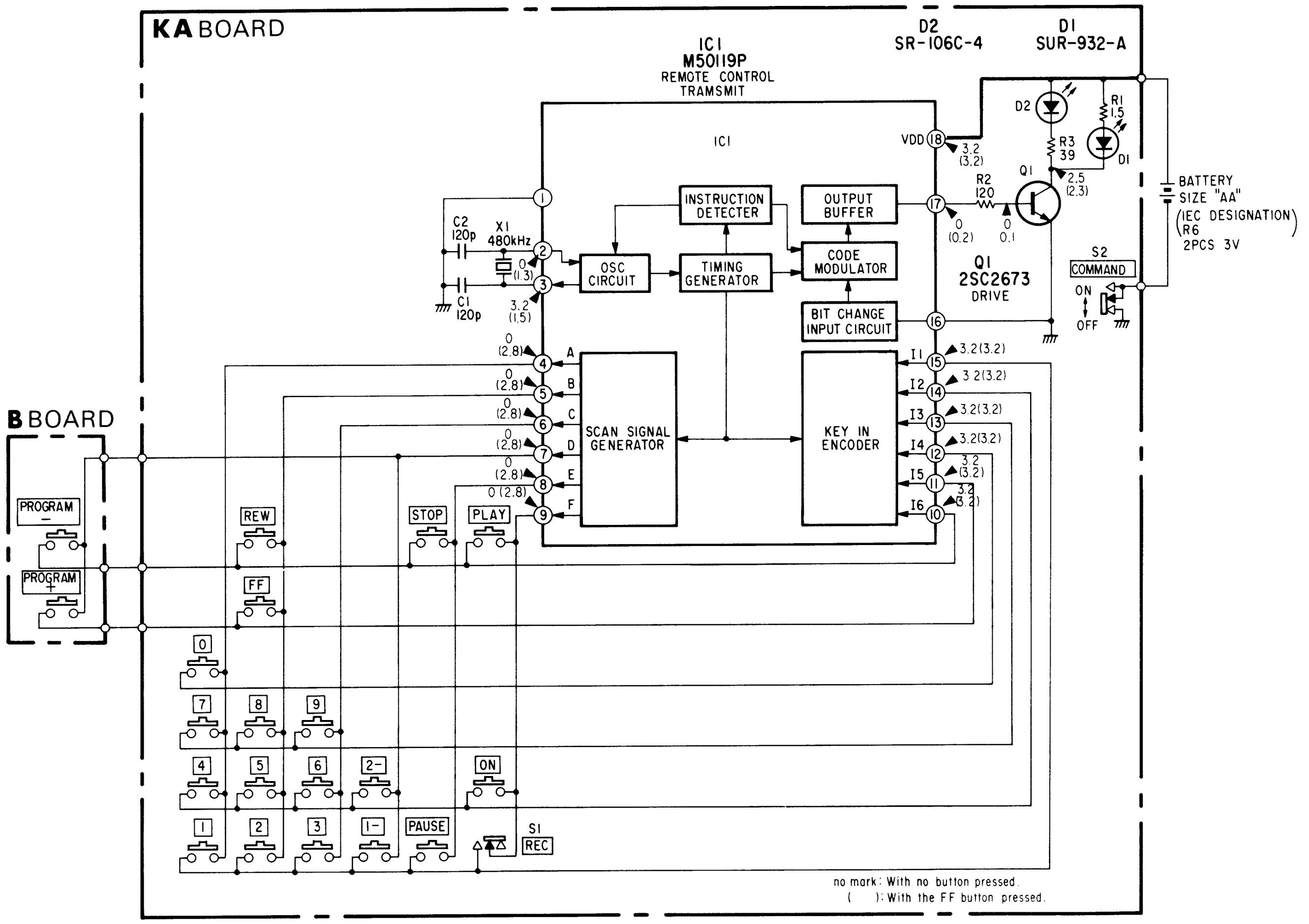
Note:

- ○— : indicates a lead wire mounted on the component side.
- ●— : indicates a lead wire mounted on the printed side.
- ⊗ : Through hole.
- ▨ : soldering side
- ▨ : B+ pattern
- ▨ : carbon pattern

When indicating parts by reference number, please include the board name.

---

2. SCHEMATIC DIAGRAM


KA BOARD
IC1
M50119P
REMOTE CONTROL TRANSMIT
D2
SR-106C-4
D1
SUR-932-A
R1
1.5
R3
39
R2
120
Q1
2SC2673
DRIVE
VDD
INSTRUCTION DETECTER
OUTPUT BUFFER
OSC CIRCUIT
TIMING GENERATOR
CODE MODULATOR
BIT CHANGE INPUT CIRCUIT
SCAN SIGNAL GENERATOR
KEY IN ENCODER
C2 120p
X1 480kHz
C1 120p
BATTERY
SIZE "AA"
(IEC DESIGNATION R6)
2PCS 3V
S2
COMMAND
ON
OFF
B BOARD
PROGRAM –
PROGRAM +
REW
FF
STOP
PLAY
ON
PAUSE
S1
REC
0
7 8 9
4 5 6 2–
1 2 3 1–
no mark: With no button pressed.
( ): With the FF button pressed.

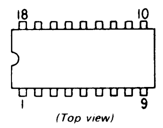
Note:

- All resistors are in ohms, 1/6W unless otherwise noted.
- All capacitors are in μF (p:pF) unless otherwise noted. 50V or less are not indicated except for electrolytic capacitors.
- ——— : B+ bus.
- The voltage value is measured using a digital tester (10MΩ).

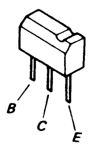
When indicating parts by reference number, please include the board name.

SEMICONDUCTORS

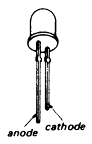
M50119P


18
10
1
9
(Top view)

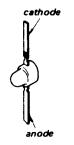
2SC2673



SLR932A


anode
cathode

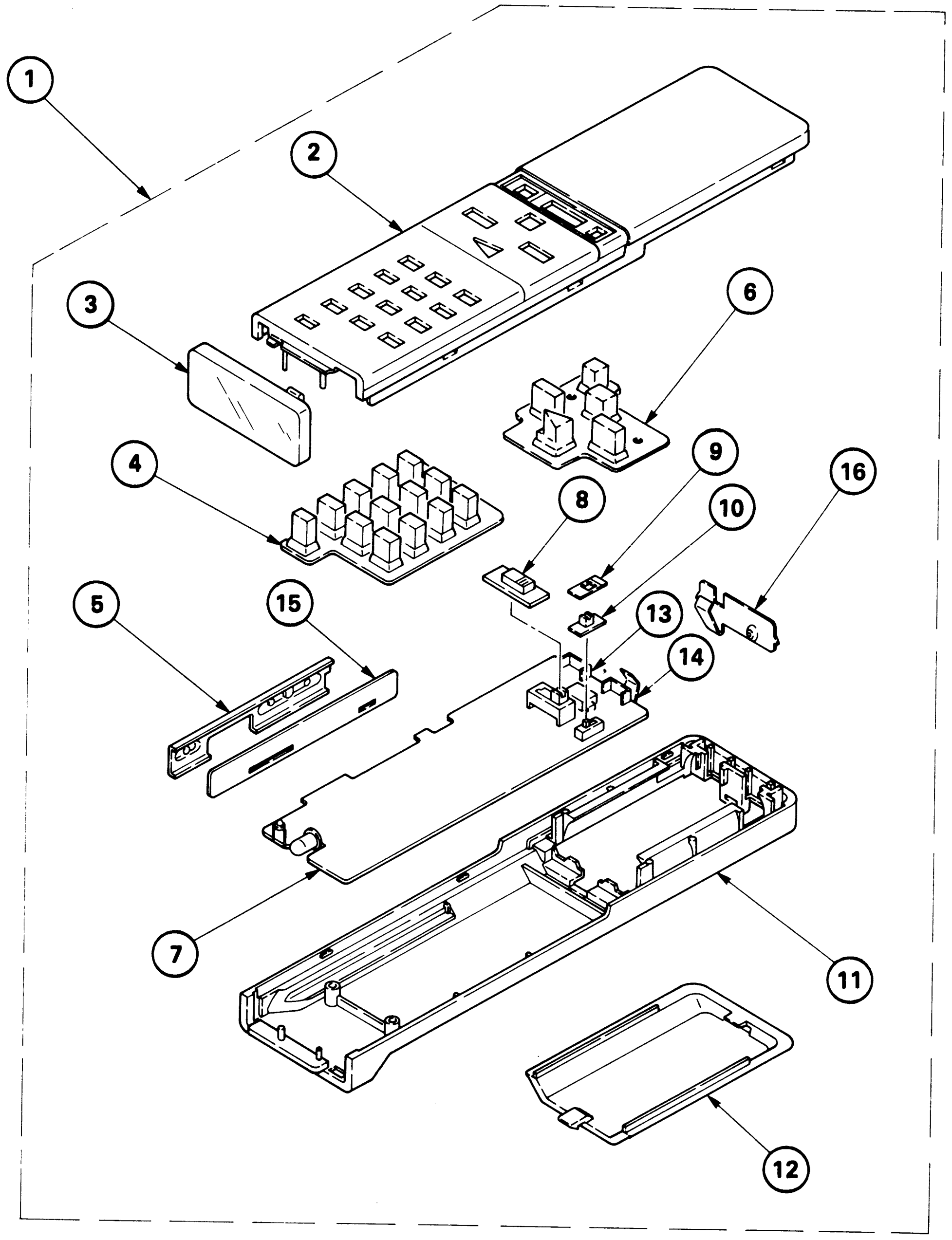
SR106C


cathode
anode

4. EXPLODED VIEW

NOTE:

- Itmes with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.



No.	ParT No.	Description	Remark
1	A-6765-566-A	COMMANDER ASSY (RMT-231/SILVER)	2-16
	A-6765-639-A	COMMANDER ASSY (RMT-231/GRAY)	2-16
2	2-383-130-12	CASE (UPPER), COMMANDER (SILVER)	
	2-383-130-22	CASE (UPPER), COMMANDER (GRAY)	
3	2-387-107-01	PANEL, COMMANDER (FRONT)	
4	2-383-128-01	RUBBER (A), CONTACT	
5	2-389-303-01	RUBBER (B), CONTACT	
6	2-383-129-01	RUBBER (C), CONTACT	
7	*1-612-946-11	KA BOARD	

No.	ParT No.	Description	Remark
8	2-387-101-01	BUTTON, RECORDING	
9	2-387-113-11	PLATE, COLOR	
10	2-383-127-01	BUTTON, SLIDE	
11	2-387-123-01	CASE (LOWER), COMMANDER	
12	2-387-105-01	COVER, BATTERY	
13	2-387-104-01	TERMINAL (B), BATTERY	
14	2-387-103-01	TERMINAL (A), BATTERY	
15	*1-612-165-11	B BOARD	
16	4-350-925-00	TERMINAL (C), BATTERY	

5. ELECTRICAL PARTS LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

RESISTORS

- All resistors are in ohms
- F : nonflammable

- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

CAPACITORS

- MF : μF, PF : μμF

COILS

- MMH : mH, UH : μH

Ref.No	Part No.	Description				Remark
	*1-612-946-11	KA BOARD *********				
	2-387-103-01	TERMINAL (A), BATTERY				
	2-387-104-01	TERMINAL (B), BATTERY				
		CAPACITOR				
C1	1-102-107-00	CERAMIC	120PF	10%	50V	
C2	1-102-107-00	CERAMIC	120PF	10%	50V	
		DIODE				
D1	8-719-912-39	DIODE SLR-932A				
D2	8-719-100-06	DIODE SR106C				
		IC				
IC1	8-759-600-07	IC M50119P				
		TRANSISTOR				
Q1	8-729-967-32	TRANSISTOR 2SC2673				
		RESISTOR				
R1	1-246-405-25	CARBON	1.5	5%	1/4W	
R2	1-246-772-00	CARBON	120	5%	1/8W	
R3	1-246-766-00	CARBON	39	5%	1/8W	
		SWITCH				
S1	1-554-364-00	SWITCH, SLIDE				
S2	1-553-977-00	SWITCH, SLIDE				
		CRYSTAL				
X1	1-527-476-00	OSCILLATOR, CERAMIC				
**						
	*1-612-165-11	B BOARD ********				
**						

SL-F30/F60 Series and SL-T25ME

OPERATION MANUAL

AEP Model
UK Model
E Model
West Germany Model
Australian Model
South African Model
ME Model

SONY
Betamax
SONY

(PHOTO : SL-F60E)

April, 1985

711B2 CHASSIS

APPLICABLE MODELS

SL-F30 Series	SL-F30E SL-F30UB SL-F30EC SL-F30PS SL-F30AS SL-F30SA
SL-F60 Series	SL-F60E SL-F60EC SL-F60PS SL-F60AS SL-F60SA

Beta
β VIDEO CASSETTE RECORDER
SONY®

MICROFILM

Consumer VIDEO

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1. VIDEO CIRCUIT

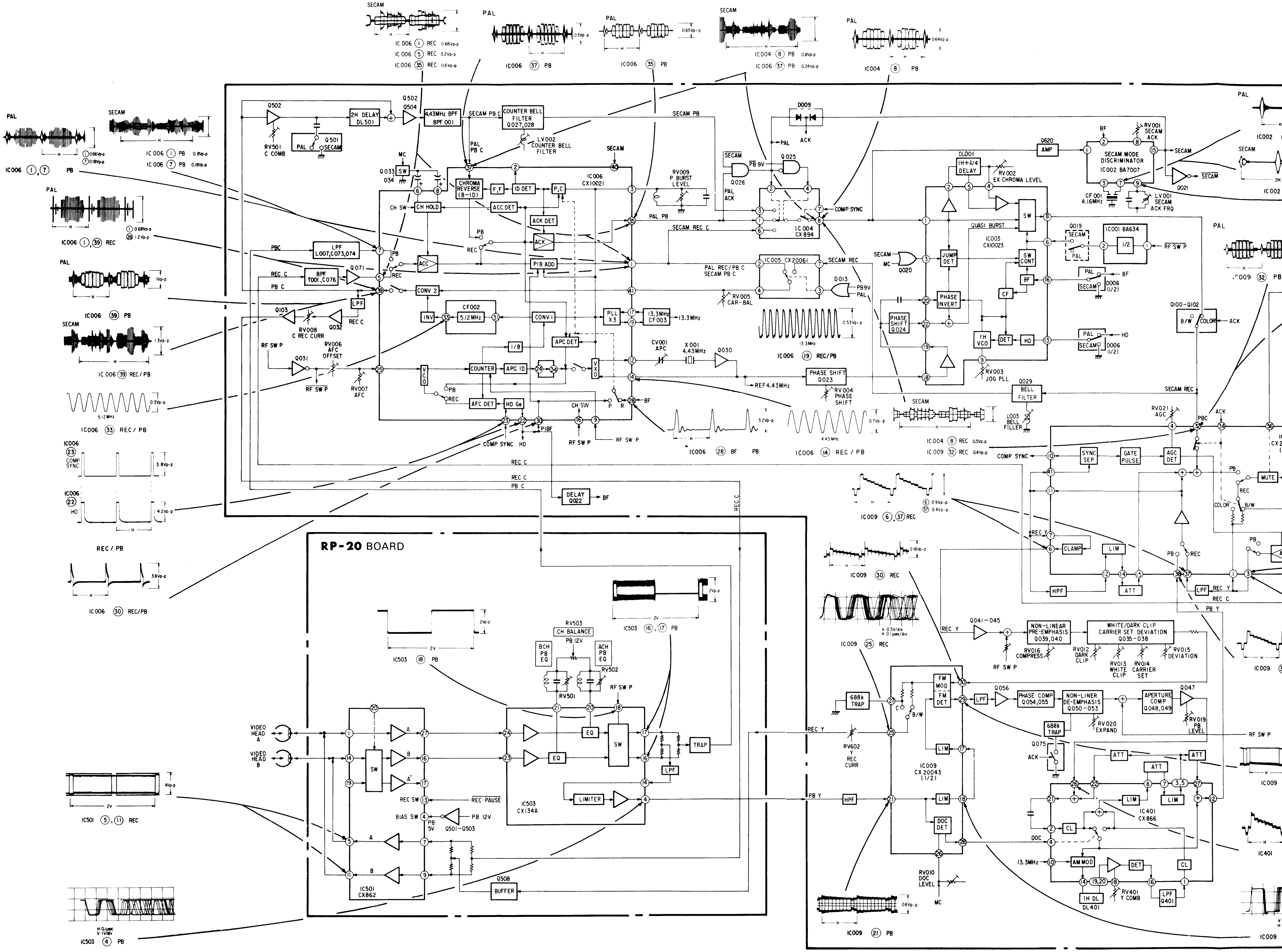

RP-20 BOARD
IC006 CX10021
IC004 CX894
IC005 CX20061
IC003 CX10023
IC002 BA7007
IC001 BA634
SECAM MODE DISCRIMINATOR
IC009 CX20043 (1/2)
IC401 CX866
IC501 CX862
IC503 CX134A
2H DELAY DL501
4.43MHz BPF BPF 001
COUNTER BELL FILTER Q027,028
LV002 COUNTER BELL FILTER
CHROMA REVERSE (B-ID)
ID DET
ACC DET
ACK DET
ACK
ACC
P/B ADD
CH HOLD
LPF L007,C073,074
BPF T001,C076
CONV 2
CONV 1
CF002 5.12MHz
INV
PLL X3
13.3MHz CF003
APC DET
APC ID
COUNTER
VCO
VXO
AFC DET
HD Ge
1/8
DL001 1H+1/4 DELAY
RV002 EX CHROMA LEVEL
RV009 P BURST LEVEL
RV005 CAR-BAL
CV001 APC
X001 4.43MHz
PHASE SHIFT Q023
RV004 PHASE SHIFT
PHASE SHIFT Q024
JUMP DET
PHASE INVERT
fH VCO
RV003 JOG PLL
SW CONT
QUASI BURST
BELL FILTER Q029
L003 BELL FILLER
CF001 4.16MHz
LV001 SECAM ACK FRQ
RV001 SECAM ACK
RF SW P
COMP SYNC
SYNC SEP
GATE PULSE
AGC DET
RV021 AGC
MUTE
CLAMP
LIM
HPF
ATT
LPF
B/W
COLOR
NON-LINEAR PRE-EMPHASIS Q039,040
WHITE/DARK CLIP CARRIER SET DEVIATION Q035-038
RV016 COMPRESS
RV012 DARK CLIP
RV013 WHITE CLIP
RV014 CARRIER SET
RV015 DEVIATION
FM MOD
FM DET
PHASE COMP Q054,055
NON-LINER DE-EMPHASIS Q050-053
RV020 EXPAND
APERTURE COMP Q048,049
RV019 PB LEVEL
688k TRAP
DOC DET
RV010 DOC LEVEL
AM MOD
1H DL DL401
RV401 Y COMB
LPF Q401
RV602 Y REC CURR
CH BALANCE
RV503
BCH PB EQ
ACH PB EQ
RV502
RV501
EQ
SW
TRAP
LIMITER
BUFFER Q508
VIDEO HEAD A
VIDEO HEAD B
REC SW
BIAS SW
REC·PAUSE
PB 12V
Q501-Q503
DELAY Q022
RV501 C COMB
RV008 C REC CURR
RV006 AFC OFFSET
RV007 AFC
IC006 ① REC 0.68Vp-p
IC006 ⑤ REC 0.2Vp-p
IC006 ㉟ REC 0.6Vp-p
IC006 ㊲ PB
IC006 ㉟ PB
IC004 ⑧ PB 0.8Vp-p
IC006 ㊲ PB 0.24Vp-p
IC004 ⑧ PB
IC006 ①,⑦ PB
IC006 ①,㊴ REC
IC006 ㊴ PB
IC006 ㊴ REC/PB
IC006 ㉝ REC/PB
IC006 ㉓ COMP SYNC
IC006 ㉒ HD
IC006 ㉚ REC/PB
IC006 ⑲ REC/PB
IC006 ㉘ BF PB
IC006 ⑭ REC / PB
IC004 ⑧ REC 0.5Vp-p
IC009 ㉜ REC 0.4Vp-p
IC009 ⑥,㊲ REC
IC009 ㉚ REC
IC009 ㉕ REC
IC009 ㉑ PB
IC503 ⑱ PB
IC503 ⑯,⑰ PB
IC501 ⑤,⑪ REC
IC503 ④ PB
IC009 ㉜ PB
IC002
IC401
IC009

Fig. 1-1 Video Circuit Block Diagram (SL-F30PS)

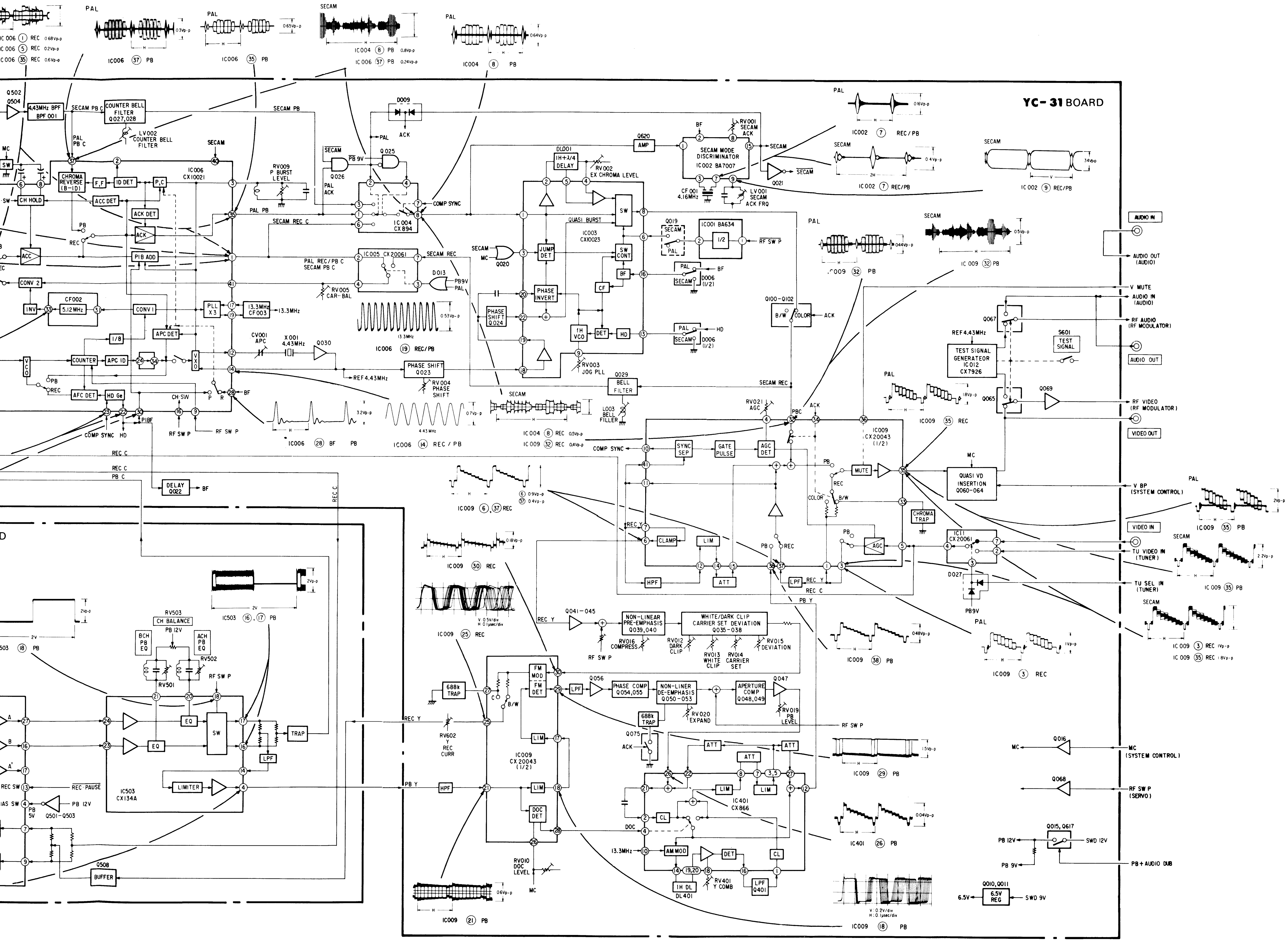

YC-31 BOARD
PAL
SECAM
IC006 ① REC 0.68Vp-p
IC006 ⑤ REC 0.2Vp-p
IC006 ㉟ REC 0.6Vp-p
IC006 ㊲ PB
IC006 ㉟ PB
IC004 ⑧ PB 0.8Vp-p
IC006 ㊲ PB 0.24Vp-p
IC004 ⑧ PB
Q502
Q504
4.43MHz BPF
BPF 001
SECAM PB C
COUNTER BELL FILTER
Q027,028
LV002 COUNTER BELL FILTER
SECAM PB
PAL PB C
CHROMA REVERSE (B-1D)
CH HOLD
F.F
ID DET
P.C
ACC DET
ACK DET
ACK
P18 ADD
ACC
CONV 2
INV
CF002 5.12MHz
CONV 1
1/8
APC DET
COUNTER
APC ID
VCO
VXO
AFC DET
HD Ge
CH SW
COMP SYNC
HD
P18F
RF SW P
REC C
PB C
DELAY Q022
BF
IC006 CX10021
RV009 P BURST LEVEL
PAL PB
SECAM REC C
PLL X3
13.3MHz CF003
CV001 APC
X001 4.43MHz
Q030
REF 4.43MHz
PHASE SHIFT Q023
RV004 PHASE SHIFT
IC006 ⑲ REC/PB
IC006 ㉘ BF PB
IC006 ⑭ REC / PB
D009
ACK
SECAM
PB 9V
Q025
Q026
PAL ACK
IC004 CX894
COMP SYNC
IC005 CX20061
SECAM REC
D013
PB9V
PAL REC/PB C
SECAM PB C
RV005 CAR-BAL
DL001 1H+λ/4 DELAY
RV002 EX CHROMA LEVEL
QUASI BURST
IC003 CX10023
SW
SW CONT
JUMP DET
Q020
PHASE INVERT
PHASE SHIFT Q024
1H VCO
DET
HD
CF
RV003 JOG PLL
Q029 BELL FILTER
L003 BELL FILLER
IC004 ⑧ REC 0.5Vp-p
IC009 ㉜ REC 0.4Vp-p
Q620 AMP
RV001 SECAM ACK
SECAM MODE DISCRIMINATOR IC002 BA7007
CF001 4.16MHz
LV001 SECAM ACK FRQ
Q021
Q019
IC001 BA634
1/2
RF SW P
D006 (1/2)
IC002 ⑦ REC/PB
IC002 ⑦ REC/PB
IC002 ⑨ REC/PB
IC009 ㉜ PB
Q100-Q102
B/W
COLOR
SECAM REC
RV021 AGC
PBC
ACK
SYNC SEP
GATE PULSE
AGC DET
IC009 CX20043 (1/2)
MUTE
COLOR
CHROMA TRAP
CLAMP
LIM
HPF
ATT
LPF
REC Y
REC C
PB Y
AUDIO IN
AUDIO OUT (AUDIO)
V MUTE
AUDIO IN (AUDIO)
RF AUDIO (RF MODULATOR)
AUDIO OUT
Q067
REF 4.43MHz
S601 TEST SIGNAL
TEST SIGNAL GENERATOR IC012 CX7926
Q065
Q069
RF VIDEO (RF MODULATOR)
VIDEO OUT
IC009 ㉟ REC
QUASI VD INSERTION Q060-064
V BP (SYSTEM CONTROL)
VIDEO IN
IC11 CX20061
TU VIDEO IN (TUNER)
D027
TU SEL IN (TUNER)
PB9V
IC009 ㉟ PB
IC009 ③ REC 1Vp-p
IC009 ㉟ REC 1.8Vp-p
IC009 ⑥,㊲ REC
IC009 ㉚ REC
IC009 ㉕ REC
IC009 ㊳ PB
IC009 ③ REC
Q041-045
NON-LINEAR PRE-EMPHASIS Q039,040
WHITE/DARK CLIP CARRIER SET DEVIATION Q035-038
RV016 COMPRESS
RV012 DARK CLIP
RV013 WHITE CLIP
RV014 CARRIER SET
RV015 DEVIATION
688k TRAP
FM MOD
FM DET
Q056
PHASE COMP Q054,055
NON-LINER DE-EMPHASIS Q050-053
RV020 EXPAND
APERTURE COMP Q048,049
Q047
RV019 PB LEVEL
RV602 Y REC CURR
IC009 CX20043 (1/2)
DOC DET
RV010 DOC LEVEL
MC
Q075
IC401 CX866
DOC
CL
13.3MHz
AM MOD
1H DL DL401
RV401 Y COMB
LPF Q401
IC009 ㉙ PB
IC401 ㉖ PB
IC009 ⑱ PB
IC009 ㉑ PB
Q016
MC (SYSTEM CONTROL)
Q068
RF SW P (SERVO)
Q015, Q617
PB 12V
SWD 12V
PB 9V
PB+AUDIO DUB
Q010,Q011 6.5V REG
SWD 9V
IC503 ⑯,⑰ PB
IC503 ⑱ PB
RV503 CH BALANCE
PB 12V
BCH PB EQ
ACH PB EQ
RV502
RV501
EQ
SW
TRAP
LPF
LIMITER
IC503 CX134A
REC PAUSE
BIAS SW
Q501-Q503
Q508 BUFFER
REC SW

Fig. 1-1 Video Circuit Block Diagram (SL-F30PS)

The operation of the SL-F30/F60/T25 video circuit is generally the same as that of the SL-C30 series circuit. Some chips of the latter are integrated into single chips, and some discrete circuits are replaced by ICs.

	SL-C30	SL-F30/F60/T25
AGC, SYNC SEP	CX867	CX20043
NOISE CANCELL, Y/C MIX, MUTING	CX868	
MOD/DEMOD, DOC	CX864	
ACC, APC, ACK	CX869	CX10021
FREQUENCY CONVERTER, VCO, COUNTER	CX882	
COUNTER	CX7945	
AFDR, VCO or VXO	CX20008,CX870A	
JOG CHROMA, 1H EXCHANGE	discret	CX10023
VIDEO REC/PB AMP	CX862, CX134A	CX862, CX134A

Table 1-1

1-1. YC-31 BOARD

1-1-1. Y Recording System

The video signals input to the LINE IN terminal are input to IC011 at pin ⑦ , and output at pin ④ . In the IC, the input video signals are switched over with the tuner video signals input at pin ②, by the TUNER SELECT +PB signal. The signals output from pin ④ of IC011 are divided into two parts, one part being reinput to pin ⑤ of chroma processing IC006 via the band pass filter to become recording chroma signals, and the other part being input to pin ⑤ of IC009 for AGC processing and subsequent outputting from pin ③.

The signals output from pin ③ of IC009 are divided into two parts, one part being reinput to IC009 through pin ①, and for outputting to the video output circuit via the REC/PB select switch for use as the video signals for the E-E system, and the other part being reinput to IC009 through pin ㊲ after the elimination of the chroma signals through low pass filter (LPF001), for outputting as the recording Y signals from pin ⑪ via REC/PB select switch. This signal is further divided into two parts, one part being branched to the sync separation circuit through pin ㊶ , and the other part being reinput through pin ⑦ for sync tip clamping and then for outputting to the pre-emphasis circuit from pin ⑥ . This sync tip clamping is designed to fix the sync tip frequency of the Y-FM signals by fixing the sync tip level of the Y signals input to the pre-emphasis circuit.

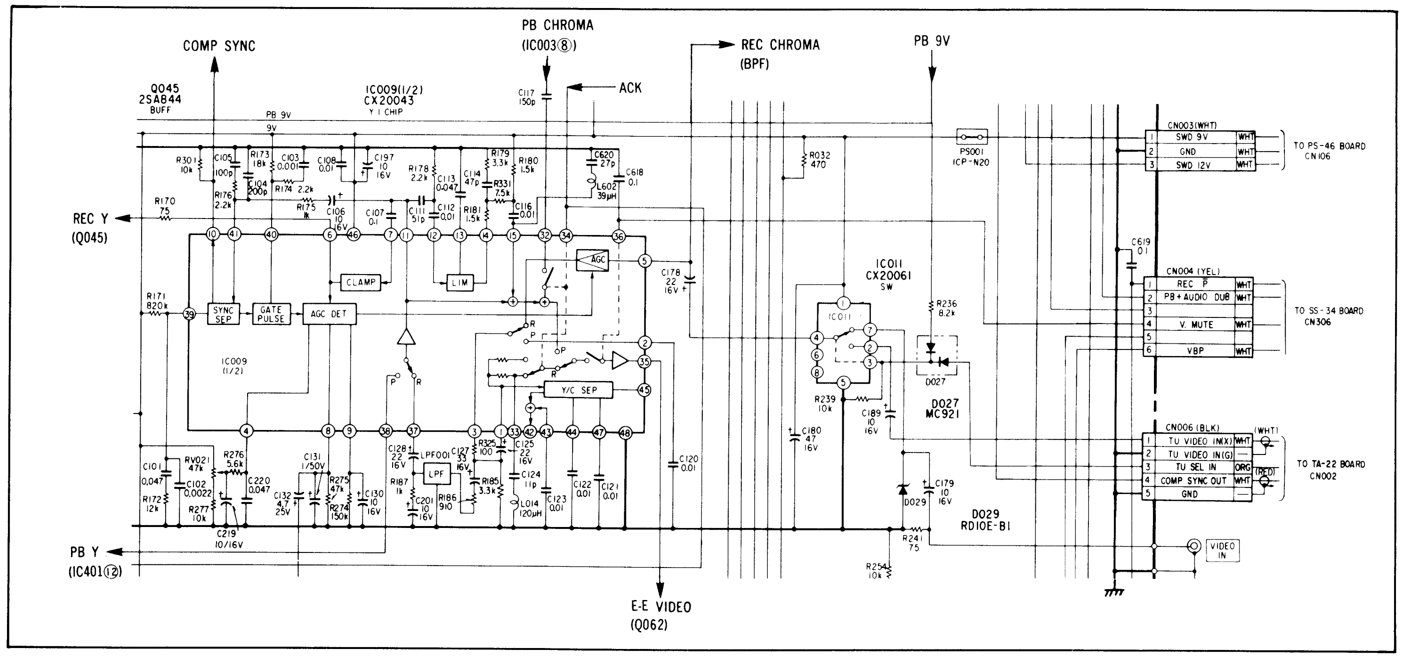

COMP SYNC
Q045 2SA844 BUFF
IC009(1/2) CX20043 Y 1 CHIP
PB CHROMA (IC003⑧)
REC CHROMA (BPF)
PB 9V
ACK
REC Y (Q045)
CLAMP
LIM
AGC
SYNC SEP
GATE PULSE
AGC DET
Y/C SEP
LPF
IC009 (1/2)
IC011 CX20061 SW
D027 MC921
D029 RD10E-B1
CN003(WHT)
SWD 9V
GND
SWD 12V
TO PS-46 BOARD CN106
CN004 (YEL)
REC
PB+AUDIO DUB
V. MUTE
VBP
TO SS-34 BOARD CN306
CN006 (BLK)
TU VIDEO (MIX)
TU VIDEO (N/G)
TU SEL IN
COMP SYNC OUT
GND
TO TA-22 BOARD CN002
VIDEO IN
PB Y (IC401⑫)
E-E VIDEO (Q062)

Fig. 1-2 Input Select, AGC, and Sync Separation Circuit Diagram

The signal input to the pre-emphasis circuit flows through Q045, Q042, Q041 in this sequence and is shifted by $\frac{1}{2}f_H$ by RF SW pulse signal (PG signal). Then, the signal is given pre-emphasis non-linearly by Q040, and input to the base of Q038. RV016 serves to set the signal compression by setting the bias voltage applied to D019 and D020 via Q039.

The signal input to the Q038 base is input to IC009 through pin ㉚ from the Q038 collector, and current-drives the FM modulator in IC009.

RV015 is used to set the frequency deviation, RV014 the sync tip carrier frequency, RV012 the dark clip level, and RV013 the white clip level.

The signal frequency-modulated in IC009 (Y-FM signals) is output from pin ㉕ to the RP20 board via RV602.

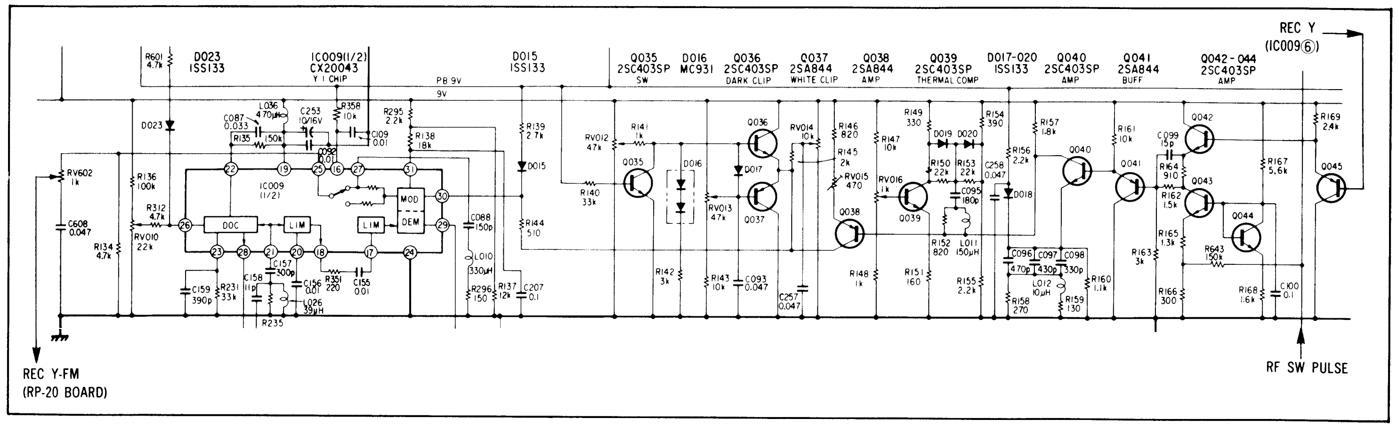

REC Y (IC009⑥)
D023 1SS133
IC009(1/2) CX20043 Y 1 CHIP
D015 1SS133
Q035 2SC403SP SW
D016 MC931
Q036 2SC403SP DARK CLIP
Q037 2SA844 WHITE CLIP
Q038 2SA844 AMP
Q039 2SC403SP THERMAL COMP
D017-020 1SS133
Q040 2SC403SP
Q041 2SA844 BUFF
Q042-044 2SC403SP AMP
DOC
LIM
MOD
DEM
REC Y-FM (RP-20 BOARD)
RF SW PULSE

Fig. 1-3 PRE-EMPHASIS and FM Modulation Circuit Diagram

1-1-2. Y Playback System

The Y-FM signal amplified by the RP-20 board is input to IC009 through pin ㉑ , and is output through pin ⑱ via a limiter and then, reinput through pin ⑰ . Then, the signal is input to the FM demodulator via a limiter, and is output from pin ㉙ as Y signals. The Y signal flows through the low-pass filter consisting of L021 through L023, C144 through C147, and Q056, and enter the equalizer circuit consisting of Q054 and Q055, where the phase deformation caused by the low-pass filter is corrected. The L and C connected to the collector of Q053 are a 4.43MHz trap that operates during color playback.

Subsequently, the Y signal enter the de-emphasis circuit, where it is amplified by Q053 and Q052, and then, de-emphasized non-linearly by Q051.

RV020 sets the bias voltage to be applied to D021 and D022 via Q050, to set the expand quantity of the Y signal. To the collector of Q051, the RF SW PULSE signal voltage divided by R635 and R205 is applied to cancel the field-by-field DC level fluctuation caused by $\frac{1}{2}f_H$ shift for recording. The signal is further apature compensated by Q048 and Q049, and is input to IC401 through pin ㉖ via Q047. RV019 is for setting the playback Y signal level.

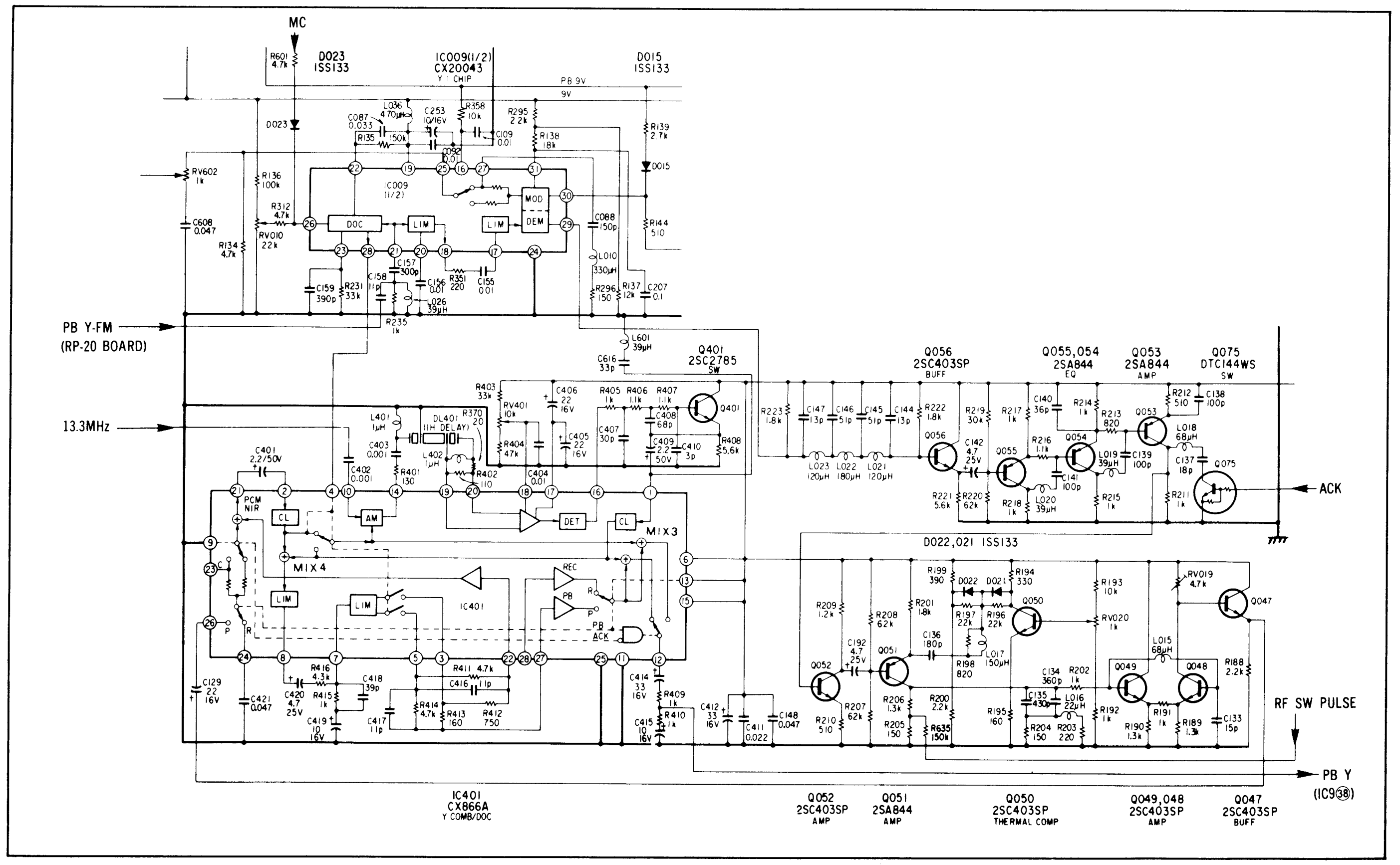
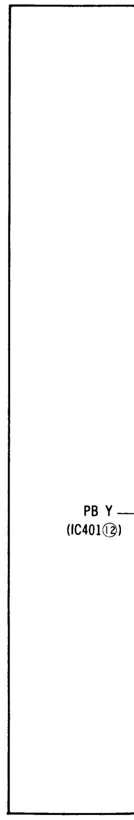

MC
D023 1SS133
IC009(1/2) CX20043 Y 1 CHIP
D015 1SS133
DOC
LIM
MOD
DEM
PB Y-FM (RP-20 BOARD)
13.3MHz
Q401 2SC2785 SW
Q056 2SC403SP BUFF
Q055,054 2SA844 EQ
Q053 2SA844 AMP
Q075 DTC144WS SW
ACK
D022,021 1SS133
PCM NIR
MIX 4
MIX 3
DET
AM
CL
LIM
IC401
RF SW PULSE
PB Y (IC9㊳)
IC401 CX866A Y COMB/DOC
Q052 2SC403SP AMP
Q051 2SA844 AMP
Q050 2SC403SP THERMAL COMP
Q049,048 2SC403SP AMP
Q047 2SC403SP BUFF

Fig. 1-4 FM De-Modulation, De-Emphasis and Y-COMB Filter Circuit Diagram

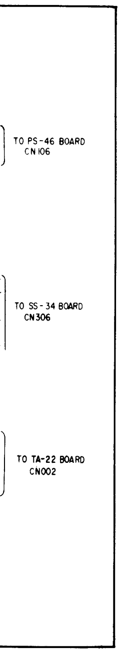
IC401 con
sation circ
istics are
compensat
Y signal in
C30 series
from the
noise canc
The Y sig
from pin (
Then, it is
the subtra
divided in
switch. On
subtraction
an AM sign
at pin (1
AM signal
to pins (2
circuit, the
filtered by



The outpu
through pi
input to t
ponent fro
across pin
componen
passed thr
⑮ , and

al are input
 the IC, the
tuner video
 +PB signal.
livided into
 of chroma
ome record-
it to pin ⑤
 outputting

livided into
ugh pin①,
a the REC/
or the E-E
09 through
als through
recording Y
 This signal


TO PS-46 BOARD CN106
TO SS-34 BOARD CN306
TO TA-22 BOARD CN002

ression by
 D020 via

 to IC009
d current-

RV014 the
 level, and

M signals)
a RV602.

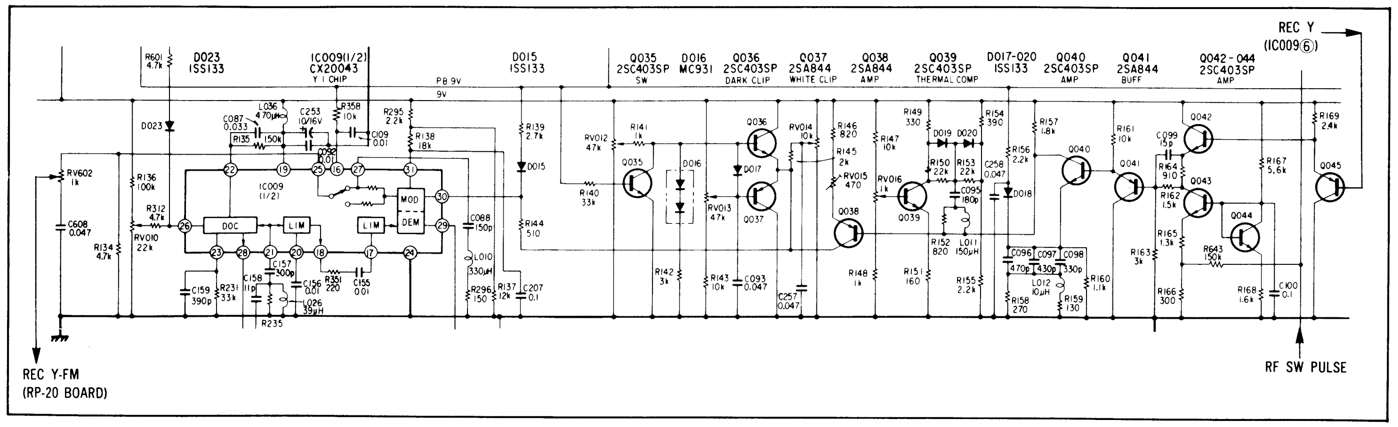

REC Y
(IC009⑥)
D023 1SS133
IC009(1/2) CX20043 Y I CHIP
D015 1SS133
Q035 2SC403SP SW
D016 MC931
Q036 2SC403SP DARK CLIP
Q037 2SA844 WHITE CLIP
Q038 2SA844 AMP
Q039 2SC403SP THERMAL COMP
D017-020 1SS133
Q040 2SC403SP AMP
Q041 2SA844 BUFF
Q042-044 2SC403SP AMP
PB 9V
DOC
LIM
MOD
DEM
REC Y-FM
(RP-20 BOARD)
RF SW PULSE

Fig. 1-3 PRE-EMPHASIS and FM Modulation Circuit Diagram

1-1-2. Y Playback System

The Y-FM signal amplified by the RP-20 board is input to IC009 through pin ㉑ , and is output through pin ⑱ via a limiter and then, reinput through pin ⑰ . Then, the signal is input to the FM demodulator via a limiter, and is output from pin ㉙ as Y signals. The Y signal flows through the low-pass filter consisting of L021 through L023, C144 through C147, and Q056, and enter the equalizer circuit consisting of Q054 and Q055, where the phase deformation caused by the low-pass filter is corrected. The L and C connected to the collector of Q053 are a 4.43MHz trap that operates during color playback.

Subsequently, the Y signal enter the de-emphasis circuit, where it is amplified by Q053 and Q052, and then, de-emphasized non-linearly by Q051.

RV020 sets the bias voltage to be applied to D021 and D022 via Q050, to set the expand quantity of the Y signal. To the collector of Q051, the RF SW PULSE signal voltage divided by R635 and R205 is applied to cancel the field-by-field DC level fluctuation caused by ½f_H shift for recording. The signal is further apature compensated by Q048 and Q049, and is input to IC401 through pin ㉖ via Q047. RV019 is for setting the playback Y signal level.

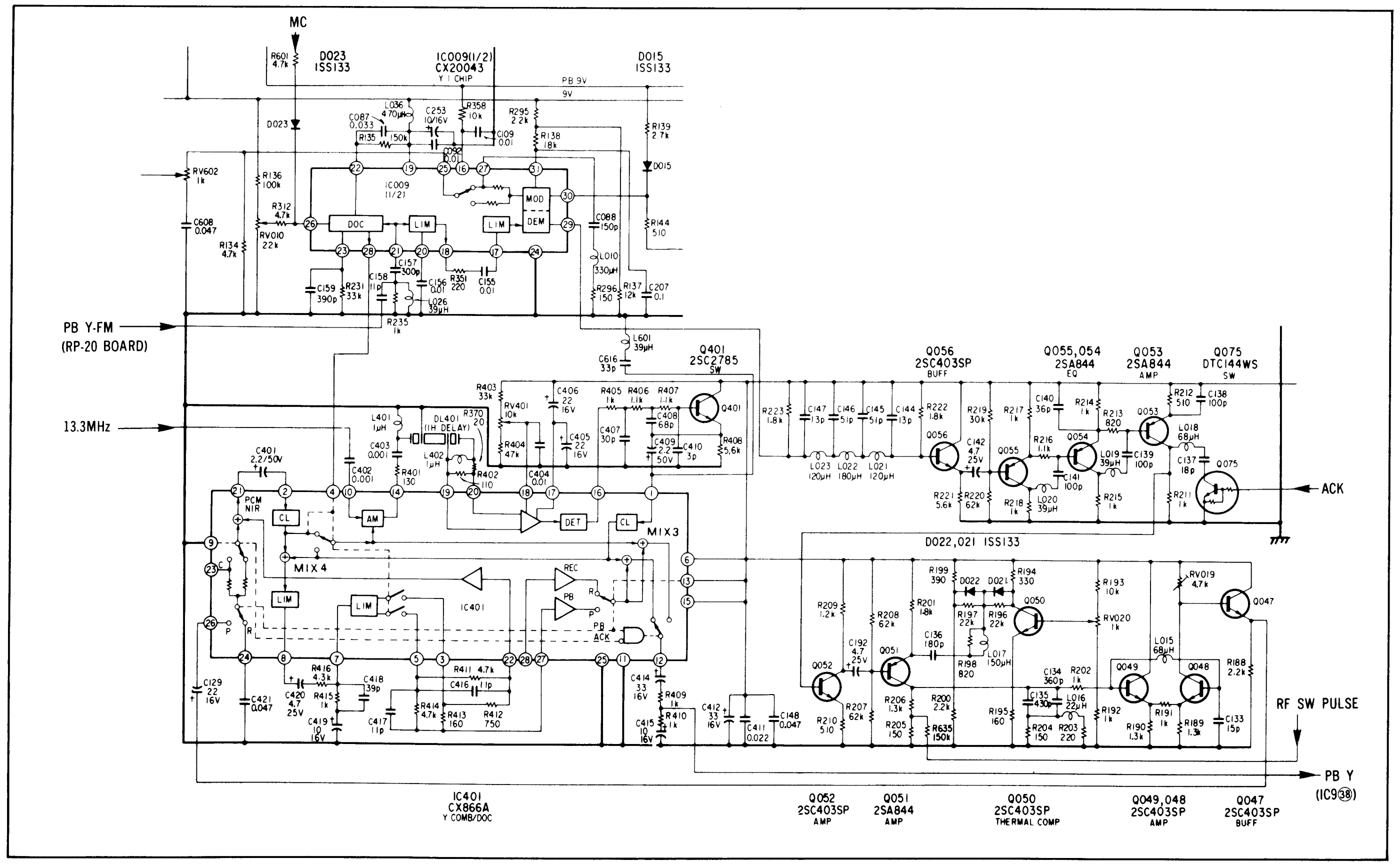

MC
D023 1SS133
IC009(1/2) CX20043 Y I CHIP
D015 1SS133
PB Y-FM
(RP-20 BOARD)
13.3MHz
DL401 (1H DELAY)
MIX 3
MIX 4
CL
AM
DET
LIM
ACK
RF SW PULSE
PB Y
(IC9㊳)
Q401 2SC2785 SW
Q056 2SC403SP BUFF
Q055,054 2SA844 EQ
Q053 2SA844 AMP
Q075 DTC144WS SW
D022,021 1SS133
IC401 CX866A Y COMB/DOC
Q052 2SC403SP AMP
Q051 2SA844 AMP
Q050 2SC403SP THERMAL COMP
Q049,048 2SC403SP AMP
Q047 2SC403SP BUFF

Fig. 1-4 FM De-Modulation, De-Emphasis and Y-COMB Filter Circuit Diagram

IC401 contains a Y-COMB filter and a dropout compensation circuit. Here, the Y signal line correlation characteristics are utilized to cancel noise, cancel crosstalk, and compensate for dropout. While noise is canceled from the Y signal immediately after FM demodulation with the SL-C30 series, noise is cancelled in the SL-F30/F60/T25 from the perfect Y signals after de-emphasis, for better noise cancelling effect at the contour lines of the picture. The Y signal input to IC401 at pin ㉖ is output once from pin ㉑ , and reinput through pin ②, and clamped. Then, it is divided into two parts, with one part input to the subtraction circuit (MIX4), and the other further divided into two parts after passing through the DOC switch. One part is the main signal part, for input to the subtraction circuit (MIX3), and the other is converted into an AM signal using the 13.3MHz (4.43MHz x 3) wave input at pin ⑩ as the carrier, for output from pin ⑭ . This AM signal is then delayed by 1H in DL401, and input to pins ⑳ and ⑲ . Then, its level is adjusted by the AGC circuit, then, detected, then, output from pin ⑯ , then, filtered by the low pass filter Q401, then, input to pin ① of IC401, then, clamped, and then, input to the DOC switch mentioned above, and at the same time, also input to the subtraction circuit (MIX4). The DOC switch switches automatically to the 1H delay side when a dropout occurs to turn the DOC pulses to H. As the dropout is compensated for in the Y signal stage in the SL-F30/F60/T25, unlike the SL-C30 Series circuits in which the dropout compensation is made in the Y-FM stage, the switching noise is less conspicuous. In the subtraction circuit (MIX4), the 1H delayed Y signal is subtracted from the undelayed Y signal. This output signal of the subtraction (MIX4) is output through pin ⑧ via the limiter, and reinput from pin ⑦ after passing through the filter, then, output via another limiter from pins ⑤ and ③ , and then, input to pin ㉗ after phase compensation. Since this signal consists almost entirely of the noise component and the cross-talk component from the adjacent track, when this signal is subtracted from the main signal in the subtraction circuit (MIX3), the Y signal output from pin ⑫ of IC401 is free from noise and cross-talk.

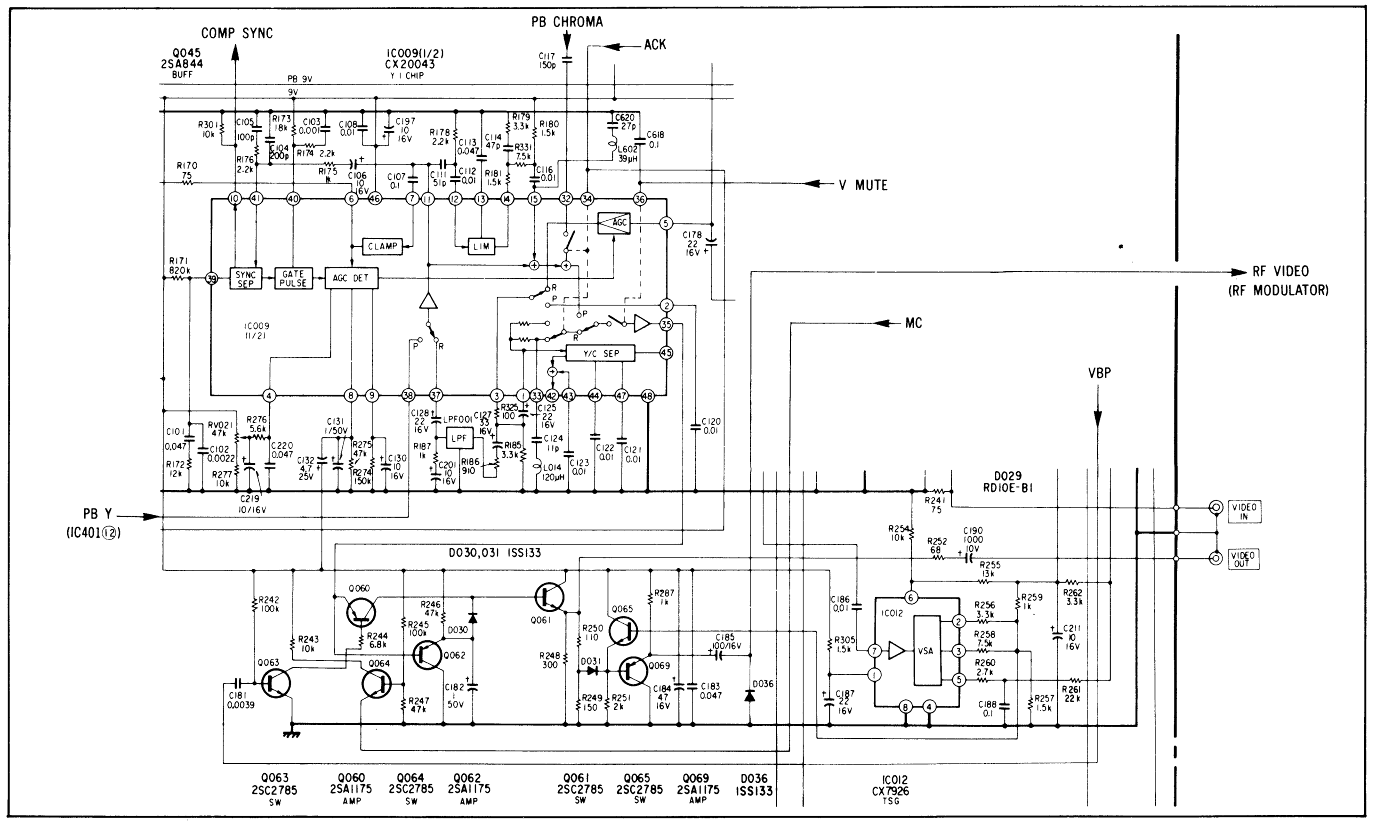

COMP SYNC
PB CHROMA
ACK
Q045 2SA844 BUFF
IC009(1/2) CX20043 Y I CHIP
PB 9V
V MUTE
CLAMP
LIM
AGC
SYNC SEP
GATE PULSE
AGC DET
Y/C SEP
LPF
RF VIDEO
(RF MODULATOR)
MC
VBP
D029 RD10E-B1
PB Y
(IC401⑫)
D030,031 1SS133
VIDEO IN
VIDEO OUT
VSA
Q063 2SC2785 SW
Q060 2SA1175 AMP
Q064 2SC2785 SW
Q062 2SA1175 AMP
Q061 2SC2785 SW
Q065 2SC2785 SW
Q069 2SA1175 AMP
D036 1SS133
IC012 CX7926 TSG

Fig. 1-5 Noise Canceler, Y/C Mix and Video Out Circuit Diagram

The output signal from pin ⑫ of IC401 is input to IC009 through pin ㊳ , passes through the REC/PB select switch, input to the noise cancel circuit, freed of high range component from the Y signal by the high pass filter connected across pins ⑪ and ⑫ of IC009, and have the noise component removed by a limiter. This noise component is passed through a compensation circuit across pins ⑭ and ⑮ , and added to the subtraction circuit to subtract it from the main signal for noise cancellation. The noise-cancelled Y signal is mixed with the chroma signal input to pin ㉜ , and output from pin ㉟ after flowing through the REC/PB select circuit, muting circuit, and the buffer circuit. The signal is then output from the VIDEO OUT terminal via the quasi VD insertion circuit of Q060 through Q064. The quasi VD is inserted only during a speed-change playback by an MC signal.

1-1-3. Chroma REC System (PAL)

The video signal is output from pin ④ of IC011. From this signal, the 4.43MHz chroma signal is taken out through BPF. The chroma signal is input to IC006 via Q071 through pin ⑤. In IC006, the chroma signal enters the ACC amp via the REC/PB switch for ACC processing. Then, the signal enters the PILOT BURST ADD circuit where a pilot burst signal is inserted in the sync signal portion, and output from pin ①. This chroma signal flows through pins ② and ④ of the PAL/SECAM select switch (IC005), and then, reenters IC006 through pin ㊶. In IC006, the signal is converted to a low band convert chroma signal (C-RF signal) by the converter II circuit, and output from pin ㊴. The C-RF signal flows through the low pass filter Q032, set for a recording current level by RV008, and is output to the RP-20 board via the buffer Q103.

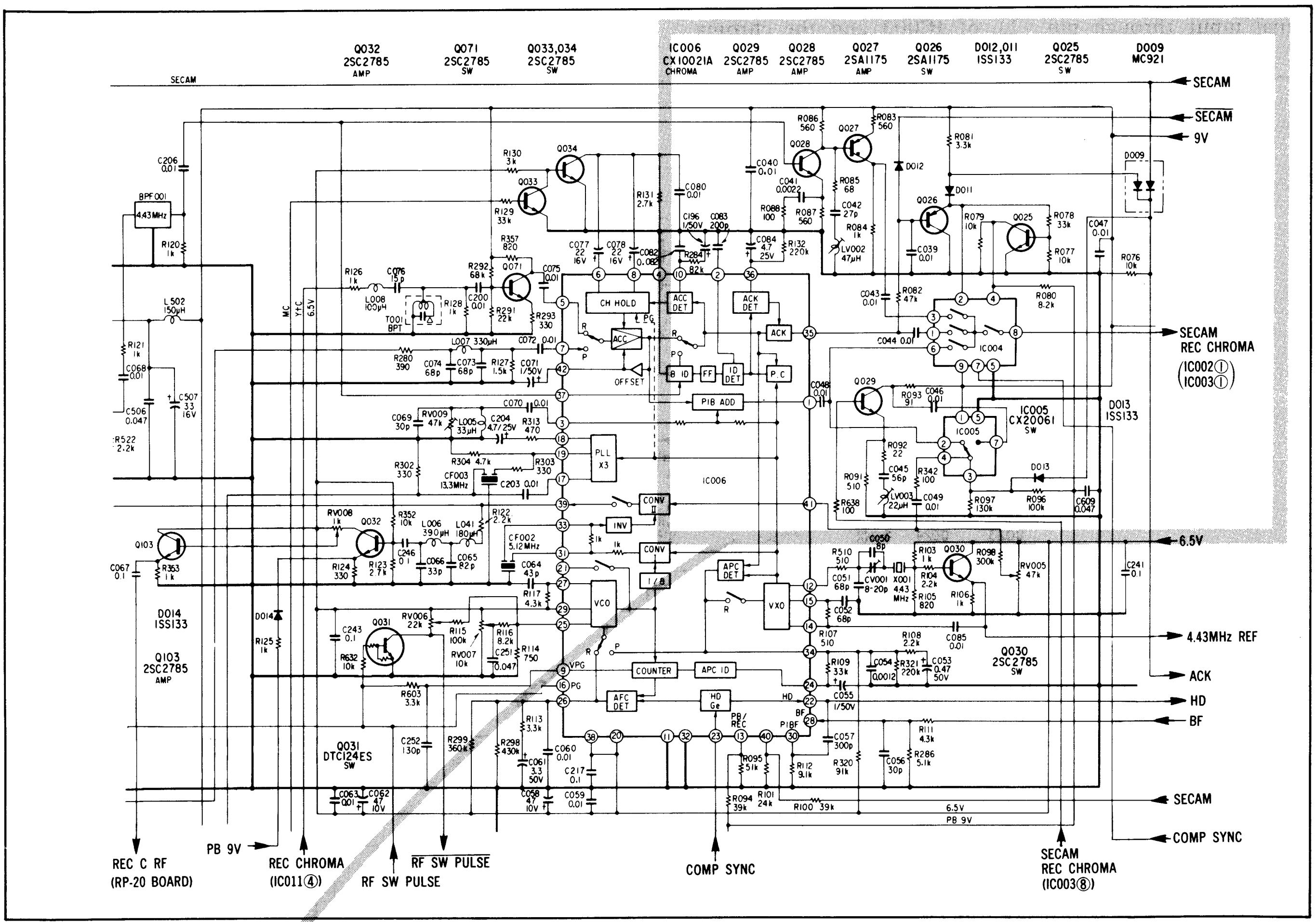
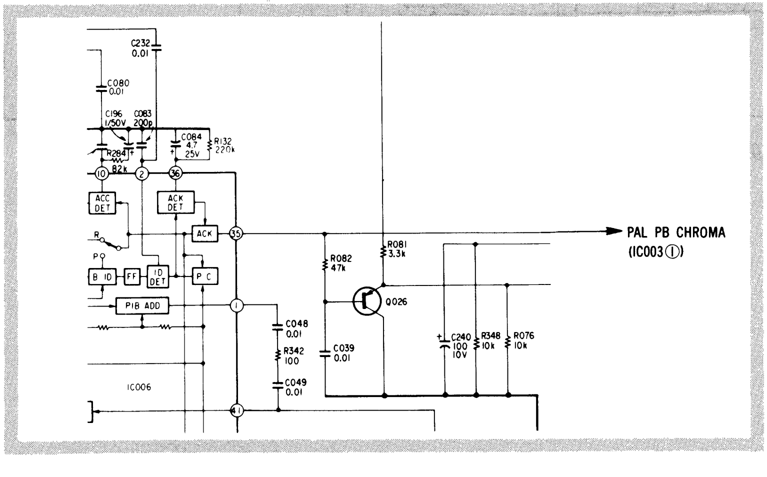

Q032 2SC2785 AMP
Q071 2SC2785 SW
Q033,034 2SC2785 SW
IC006 CX10021A CHROMA
Q029 2SC2785 AMP
Q028 2SC2785 AMP
Q027 2SA1175 AMP
Q026 2SA1175 SW
D012,011 1SS133
Q025 2SC2785 SW
D009 MC921
SECAM
9V
BPF001 4.43MHz
L502 150μH
CH HOLD
ACC DET
ACK DET
ACK
ACC
B ID
FF
ID DET
P C
PIB ADD
OFFSET
PLL X3
CF003 13.3MHz
CF002 5.12MHz
CONV II
CONV
INV
1/8
VCO
VXO
APC DET
COUNTER
APC ID
AFC DET
HD Ge
IC004
IC005 CX20061 SW
D013 1SS133
SECAM REC CHROMA (IC002①) (IC003①)
6.5V
4.43MHz REF
ACK
HD
BF
SECAM
COMP SYNC
Q030 2SC2785 SW
Q103 2SC2785 AMP
D014 1SS133
Q031 DTC124ES SW
REC C RF (RP-20 BOARD)
PB 9V
REC CHROMA (IC011④)
RF SW PULSE
COMP SYNC
SECAM REC CHROMA (IC003⑧)
PB/REC
6.5V
PB 9V

Fig. 1-6 REC CHROMA Process Circuit Diagram (PAL/SECAM MODEL)

(PAL MODEL)


C232 0.01
C080 0.01
C196 1/50V
C083 200p
C084 4.7 25V
R132 220k
R284 82k
ACC DET
ACK DET
ACK
B ID
FF
ID DET
P C
PIB ADD
IC006
R082 47k
R081 3.3k
Q026
PAL PB CHROMA (IC003①)
C048 0.01
R342 100
C049 0.01
C039 0.01
C240 100 10V
R348 10k
R076 10k

1-1-4. Chroma REC System (SECAM)

The circuit operation is the same as the PAL signal up to the ACC processing. After the ACC processing in IC006, the signal passes the PILOT BURST ADD circuit without any change, and is output from pin ① . This signal is input to the PAL/SECAM select switch IC004, at pin ⑥ and output from pin ⑧ . This output of pin ⑧ in IC004 is then input to pin ① of IC003 and pin ① of IC002 via Q620. IC002 discriminates between PAL and SECAM. IC003 is for the 1H-exchange-chroma-process, i.e., the chroma signal input through pin ① of IC003 and the chroma signal which has been delayed by 1H by DL001 across pins ② , ⑤ and ④ are switched over by the frequency ½ divided RF SW PULSE signal input from pin ⑥ for color sequence correction. The 1H-exchange-chroma-processed signal is output from pin ⑧ . This signal is brough back to a perfect FM signal without amplitude change in the bell filter of Q029, and enters the converter II circuit in IC006 at pin ㊶ after passing through the PAL/SECAM select switch IC005. From then on, the process is the same as the PAL system.

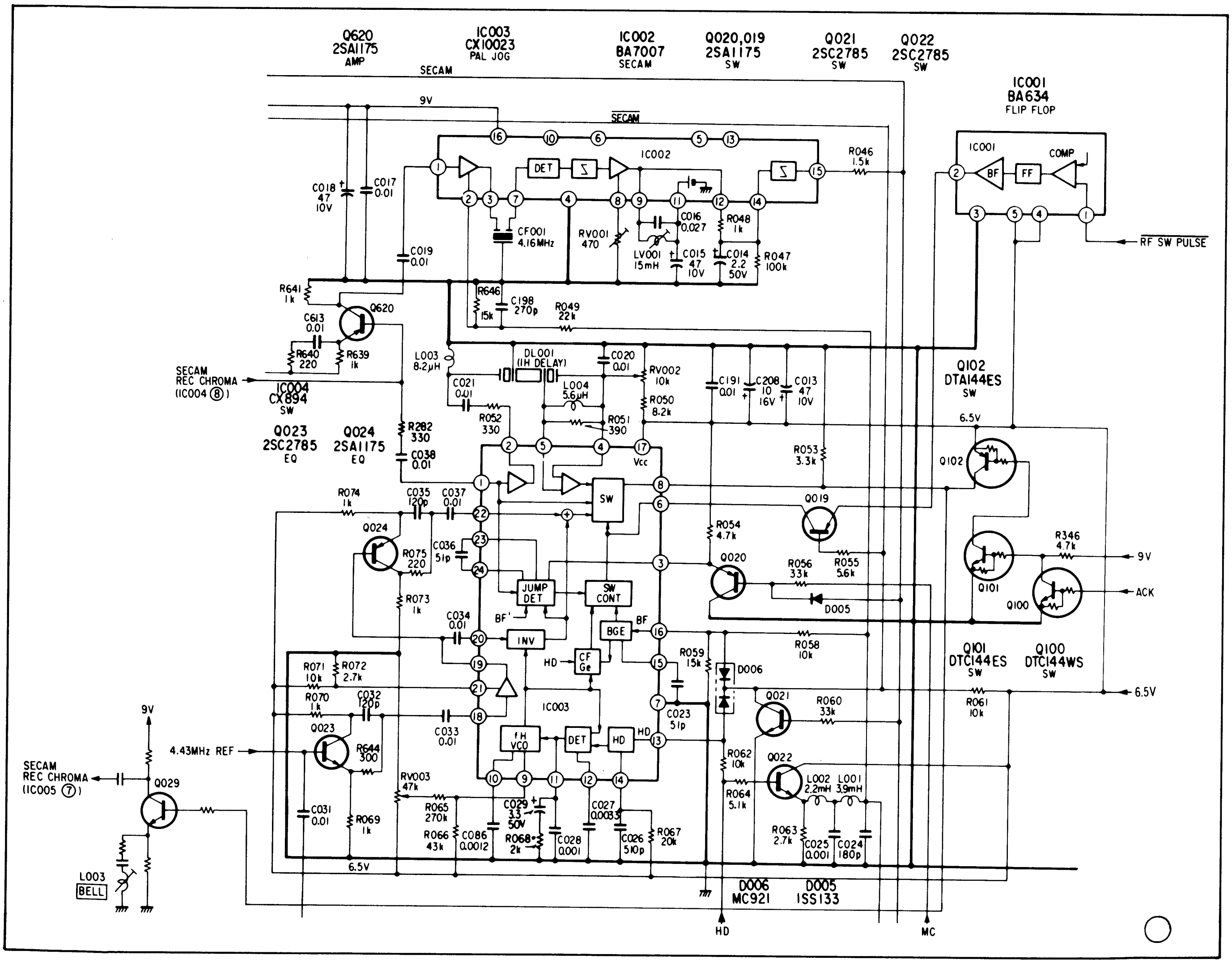
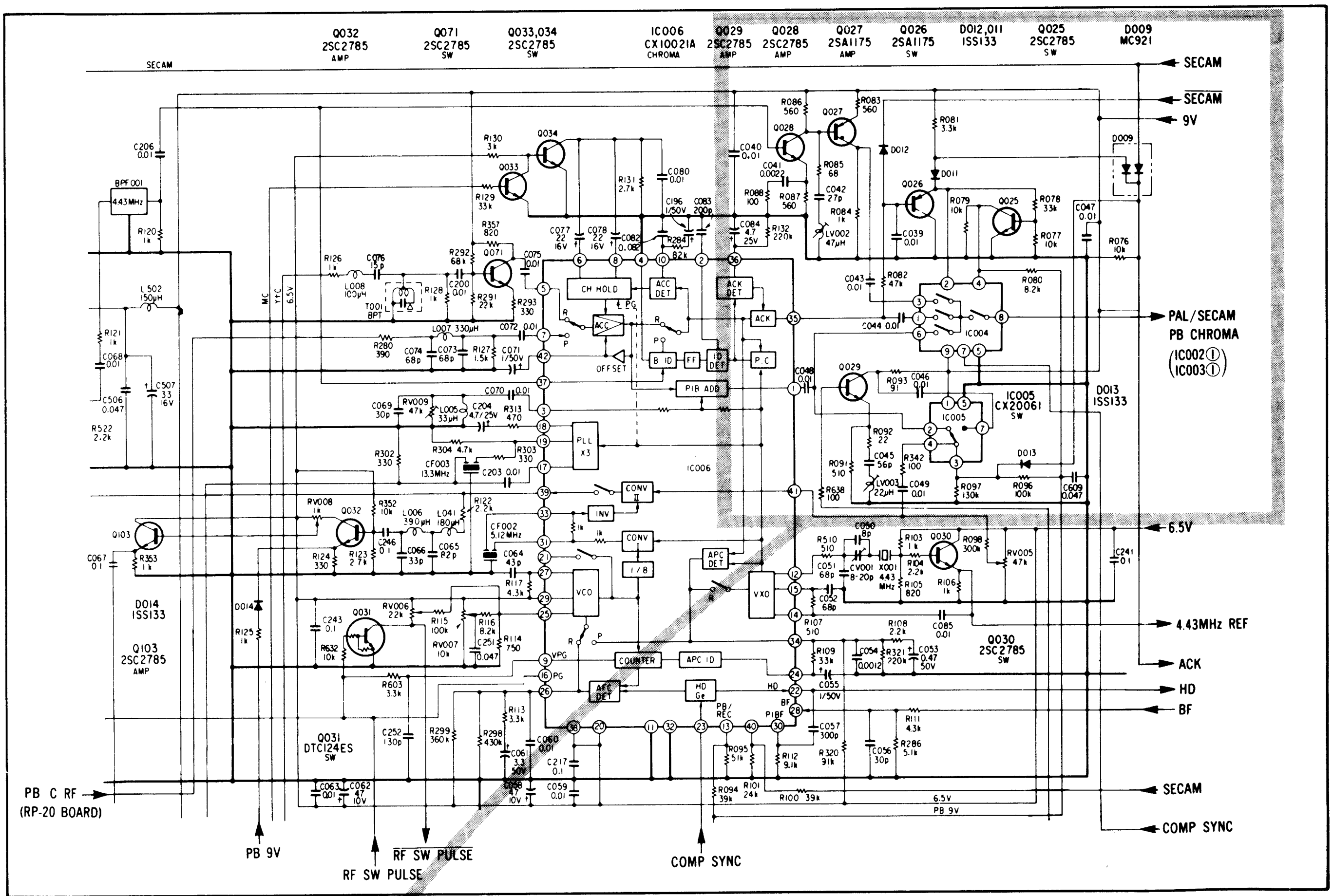

Q620
2SA1175
AMP
IC003
CX10023
PAL JOG
IC002
BA7007
SECAM
Q020,019
2SA1175
SW
Q021
2SC2785
SW
Q022
2SC2785
SW
IC001
BA634
FLIP FLOP
SECAM
9V
SECAM
IC002
DET
Σ
Σ
R046
1.5k
IC001
BF
FF
COMP
RF SW PULSE
C018
47
10V
C017
0.01
CF001
4.16MHz
RV001
470
C016
0.027
R048
1k
LV001
15mH
C015
47
10V
C014
2.2
50V
R047
100k
C019
0.01
R641
1k
R646
15k
C198
270p
R049
22k
Q620
C613
0.01
R640
220
R639
1k
SECAM
REC CHROMA
(IC004 ⑧)
IC004
CX894
SW
Q023
2SC2785
EQ
Q024
2SA1175
EQ
L003
8.2μH
DL001
(1H DELAY)
C020
0.01
RV002
10k
C021
0.01
L004
5.6μH
R050
8.2k
R052
330
R051
390
C191
0.01
C208
10
16V
C013
47
10V
Q102
DTA144ES
SW
6.5V
Q102
R053
3.3k
R282
330
C038
0.01
Vcc
SW
R074
1k
C035
120p
C037
0.01
Q019
Q024
R075
220
C036
51p
R054
4.7k
Q020
R056
33k
R055
5.6k
R346
4.7k
9V
Q101
Q100
ACK
JUMP
DET
SW
CONT
D005
R073
1k
C034
0.01
BF'
BF
BGE
INV
R058
10k
Q101
DTC144ES
SW
Q100
DTC144WS
SW
R071
10k
R072
2.7k
HD
CF
Ge
R059
15k
D006
6.5V
R070
1k
C032
120p
IC003
C023
51p
Q021
R060
33k
R061
10k
9V
Q023
C033
0.01
fH
VCO
DET
HD
HD
4.43MHz REF
R644
300
R062
10k
Q022
SECAM
REC CHROMA
(IC005 ⑦)
Q029
RV003
47k
R065
270k
C029
3.3
50V
C027
0.0033
R064
5.1k
L002
2.2mH
L001
3.9mH
C031
0.01
R069
1k
R066
43k
C086
0.0012
R068
2k
C028
0.001
C026
510p
R067
20k
R063
2.7k
C025
0.001
C024
180p
6.5V
L003
BELL
D006
MC921
D005
1SS133
HD
MC

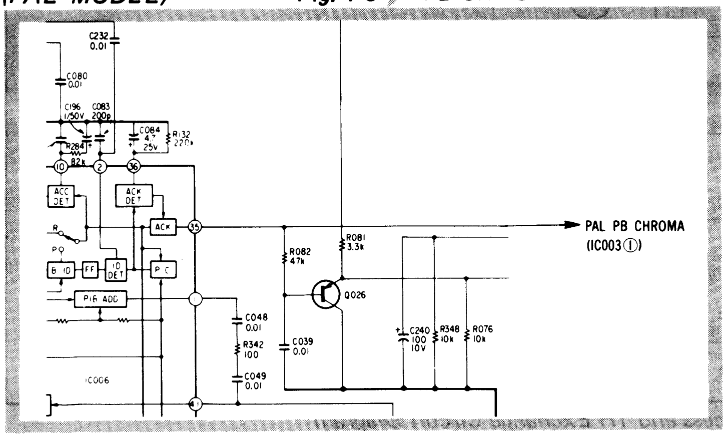
Fig. 1-7 1H Exchange and PAL/SECAM Det Circuit Diagram

1-1-5. Chroma PB System (PAL)

The C-RF signal is output from the RP-20 board, and input to IC006 through pin ⑦ after flowing through the BPF (L007, C073, C074). This signal is ACC-processed in the IC, and is output from pin ① after passing the PILOT BURST ADD circuit without receiving any effect. The signal passes through the PAL/SECAM select switch IC005 and reinput to IC006 through pin (41). It is frequency-converted in the converter II circuit into a 4.43MHz chroma signal, and output from pin (39). In IC006, also the APC circuit removes jitter from the chroma signal. The chroma signal output from pin (39) of IC006 is input to the comb filter consisting of Q502 through Q504 and DL501 (2H delay line), and the cross talk component from the adjacent track is eliminated in the filter. The chroma signal output from the comb filter is input to IC006 through pin (37) via the 4.43MHz BPF (BPF001). Then, it flows through the burst ID circuit and the ACK circuit, and is output from pin (35). The burst ID circuit serves to reverse the chroma signal phase when the APC is unlocked to shorten the time before the locking of APC. The ACK circuit serves to output an ACK signal (approx. 3.5V DC) by superposing it on the chroma signal, during the color mode. These two circuits are not used with the SECAM signal.


Q032 2SC2785 AMP
Q071 2SC2785 SW
Q033,034 2SC2785 SW
IC006 CX10021A CHROMA
Q029 2SC2785 AMP
Q028 2SC2785 AMP
Q027 2SA1175 AMP
Q026 2SA1175 SW
D012,011 1SS133
Q025 2SC2785 SW
D009 MC921
SECAM
SECAM
9V
PAL/SECAM PB CHROMA (IC002①) (IC003①)
D013 1SS133
IC005 CX20061 SW
6.5V
4.43MHz REF
ACK
HD
BF
SECAM
COMP SYNC
BPF001 4.43MHz
L502 150μH
D014 1SS133
Q103 2SC2785 AMP
Q031 DTC124ES SW
Q030 2SC2785 SW
CH HOLD
ACC
ACC DET
ACK DET
ACK
B ID
FF
ID DET
P C
PIB ADD
PLL x3
CONV
INV
CONV
1/8
VCO
APC DET
VXO
COUNTER
APC ID
AFC DET
HD Ge
OFFSET
PB/REC
PB 9V
RF SW PULSE
RF SW PULSE
COMP SYNC
PB C RF (RP-20 BOARD)

(PAL MODEL) *Fig. 1-8 PB CHROMA Process Circuit Diagram (PAL/SECAM MODEL)*


C232 0.01
C080 0.01
C196 1/50V
C083 200p
C084 4.7 25V
R132 220k
R284 82k
ACC DET
ACK DET
ACK
B ID
FF
ID DET
P C
PIB ADD
IC006
PAL PB CHROMA (IC003①)
R082 47k
R081 3.3k
Q026
C048 0.01
R342 100
C049 0.01
C039 0.01
C240 100 10V
R348 10k
R076 10k

The chroma signal output from pin ㉟ of IC006 is input to IC003 through pin ① via the PAL/SECAM select switch. Since the R-Y signal phase is reversed at each 1H with the PAL chroma signal, the sequence of (R-Y) and –(R-Y) may be reversed during speed-change PB, resulting in color inverting. To prevent this, a special jog chroma process is required. During the normal PB, the PILOT BURST signal only is cleaned in IC003, but during the speed-change PB, the following three operations are performed.

1) A stable internal burst signal is formed with the 4.43 MHz REF signal (Q030 emitter output) and the HD signal (IC006 pin ㉒ output), and this signal is inserted to the PB chroma signal to replace the burst signal (PB burst signal).
2) The PB burst signal and the internal burst signal are compared for phase to detect any color reversal, and the undelayed chroma signal and the 1H delayed chroma signal are switched over to correct the color of the PB chroma signal.
3) The PILOT BURST signal is cleaned as with the normal playback process.

The chroma signal output from pin ⑧ of IC003 is input to IC009 through pin ㉜ for mixing with the Y signal.

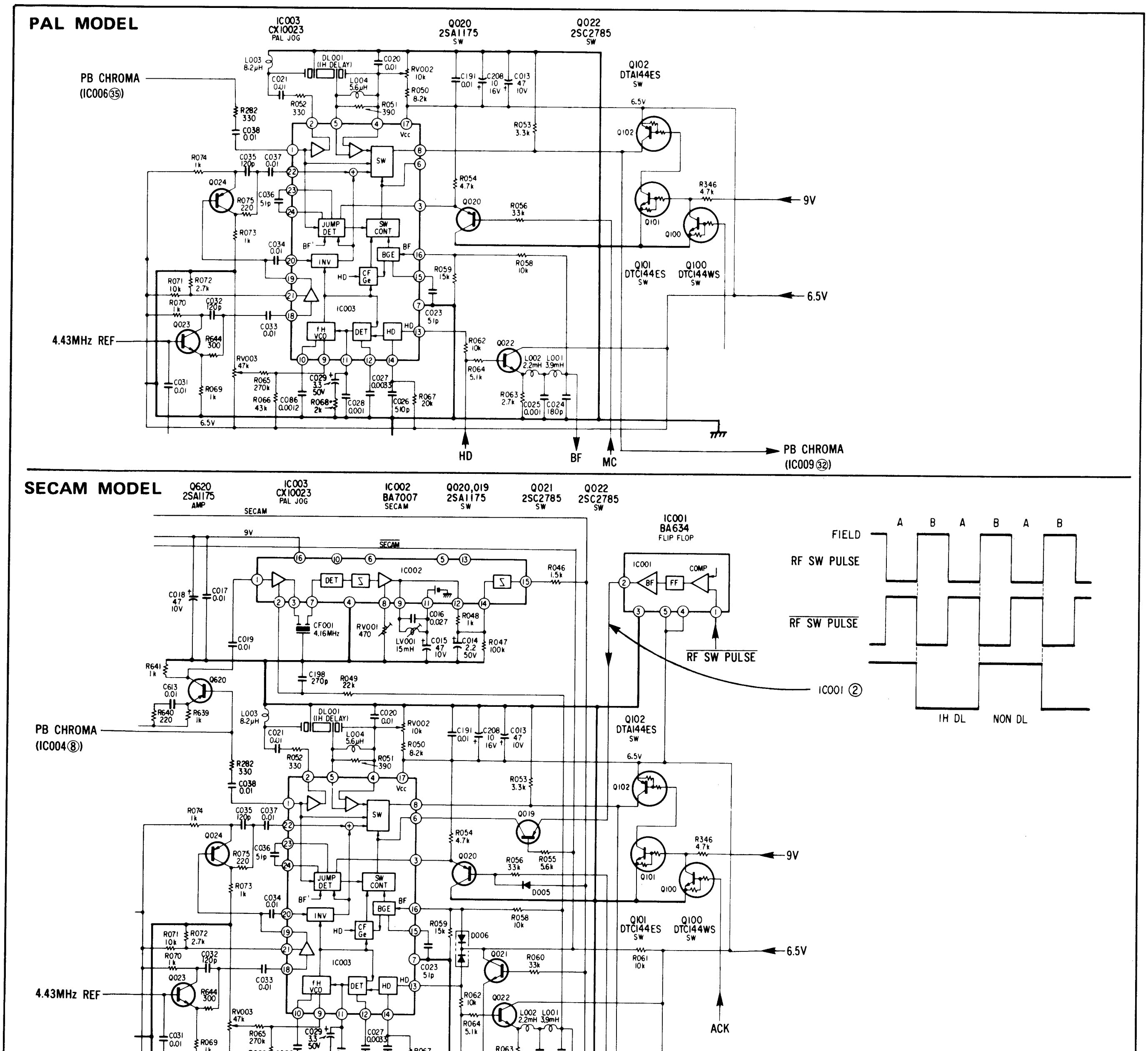

PAL MODEL
IC003 CX10023 PAL JOG
Q020 2SA1175 SW
Q022 2SC2785 SW
Q102 DTA144ES SW
PB CHROMA (IC006㉟)
DL001 (1H DELAY)
L003 8.2μH
C021 0.01
C020 0.01
RV002 10k
L004 5.6μH
R050 8.2k
R051 390
R052 330
R282 330
C038 0.01
C191 0.01
C208 10 16V
C013 47 10V
R053 3.3k
6.5V
Vcc
SW
R074 1k
C035 120p
C037 0.01
Q024
C036 51p
R075 220
R073 1k
R054 4.7k
R056 33k
R346 4.7k
9V
Q101
Q100
JUMP DET
SW CONT
BGE
INV
CF Ge
HD
BF
BF'
C034 0.01
R058 10k
R059 15k
Q101 DTC144ES SW
Q100 DTC144WS SW
R071 10k
R072 2.7k
R070 1k
C032 120p
Q023
4.43MHz REF
R644 300
C033 0.01
1H VCO
DET
C023 51p
R062 10k
R064 5.1k
L002 2.2mH
L001 3.9mH
RV003 47k
R065 270k
R066 43k
C086 0.0012
R068 2k
C029 3.3 50V
C028 0.001
C027 0.0033
C026 510p
R067 20k
R063 2.7k
C025 0.001
C024 180p
C031 0.01
R069 1k
6.5V
HD
BF
MC
PB CHROMA (IC009㉜)
SECAM MODEL
Q620 2SA1175 AMP
IC003 CX10023 PAL JOG
IC002 BA7007 SECAM
Q020,019 2SA1175 SW
Q021 2SC2785 SW
Q022 2SC2785 SW
SECAM
9V
IC002
C018 47 10V
C017 0.01
C019 0.01
CF001 4.16MHz
RV001 470
LV001 15mH
C015 47 10V
C016 0.027
C014 2.2 50V
R048 1k
R047 100k
R046 1.5k
C198 270p
R049 22k
R641 1k
C613 0.01
Q620
R640 220
R639 1k
PB CHROMA (IC004⑧)
IC001 BA634 FLIP FLOP
IC001
BF
FF
COMP
RF SW PULSE
IC001 ②
FIELD
A B A B A B
RF SW PULSE
RF SW PULSE
1H DL
NON DL
Q019
R055 5.6k
D005
D006
R060 33k
R061 10k
Q021
ACK
D006 MC921
D005 1SS133
PB CHROMA (IC009㉜)

Fig. 1-9 Jog CHROMA Process and 1H Exchange Circuit Diagram

1-1-6. Chroma PB System (SECAM)

The process is the same with the PAL signal until the frequency conversion by the converter II in IC006. The frequency converted and jitter-freed chroma signal is output from IC006 through pin ㊴ , and input to the PAL comb filter (Q502 through Q504, DL501). In the SECAM mode, Q501 is on, and therefore, the comb filter is inoperative, allowing the chroma signal to pass unchanged, via the BPF (BPF001), to the counter-bell filter consisting of Q028 and Q027. Here the signal is brought back to the normal SECAM chroma signal in this filter. Then the signal is input to IC003 through pin ① via the PAL/SECAM select switch IC004. In IC003, the signal is 1H-exchange-processed to recover the color sequence of the normal SECAM chroma signal, output from pin ⑧ , and input to IC009 through pin ㉜ for mixing with the Y signal.

1-1-7. Chroma Recording Current Muting Circuit (Only for PAL Model)

SECAM system signals recorded and played back by a PAL model set become very ugly pictures because color synchronization is not possible. When SECAM signals are recorded to prevent this, the chroma signal recording current is forcibly muted to record in the black-and-white mode. When SECAM color signals are input, chroma signals and DC voltage (approx. 3.5Vdc) are output overlapping each other from pin ㉟ of IC006 as in the PAL system. Therefore, the voltage at the emitter of Q076 reaches approx. 3.7Vdc. The voltage of the Q076 base is increased to approximately 3.75Vdc by R340 and R350.

ID detection pulses are generated on pin ② of IC006. These pulses are positive pulses only when signals are PAL chroma signals. Positive and negative pulses are always produced with SECAM chroma signals. Therefore, Q076 is switched OFF with PAL chroma signals. Q076 is switched ON by a negative pulse of the ID detection pulse with SECAM chroma signals, and C233 is charged to approximately 4.2V. Therefore, the Q077 base voltage is higher than the Q032 base voltage (approx. 1.4V dc), and Q032 is switched OFF, and chroma recording signals are muted.

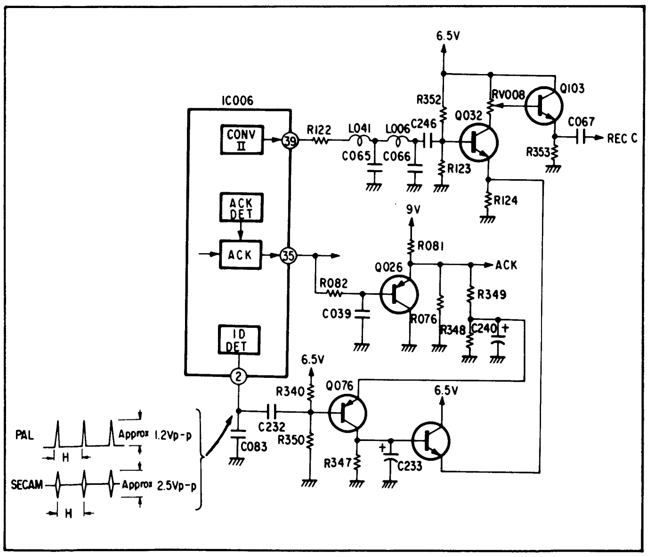

6.5V
IC006
R352
RV008
Q103
CONV II
㊴
R122
L041
L006
C246
Q032
C067
REC C
C065
C066
R353
R123
ACK DET
R124
9V
ACK
㉟
R081
Q026
ACK
R082
R349
C039
R076
R348
C240
ID DET
6.5V
②
R340
Q076
6.5V
C232
C083
R350
R347
C233
PAL
Approx 1.2Vp-p
H
SECAM
Approx 2.5Vp-p
H

Fig. 1-10

1-1-8. AFC, APC System (PAL)

REC System

The 4.43MHz chroma signal input through pin ⑤ and the 4.43MHz VXO output are applied to the APC DET for phase comparison between the chroma signal burst and the VXO output, and the error voltage is applied to the VXO via the low pass filter pin ㉞ . As a result, the VXO oscillation frequency is locked to the 4.43MHz chroma burst signal. This is the APC system.

From the COMP SYNC signal input at pin ㉓ , HD pulses are generated and applied to the AFC DET, to which also the frequency-divided $\frac{1}{351}$ (field A) or $\frac{1}{353}$ (field B) output of VCO is applied. These two signals are phase-shift-detected by AFC DET and the error voltage is applied to VCO via the low pass filter pin ㉖ to cause the VCO to oscillate at $351 \cdot f_H$ (field A) or $353 \cdot f_H$ (field B). This is the AFC system.

The VCO output is frequency-divided to 1/8 and applied to the converter I, and together with the VXO output, produces the carrier for the converter II.

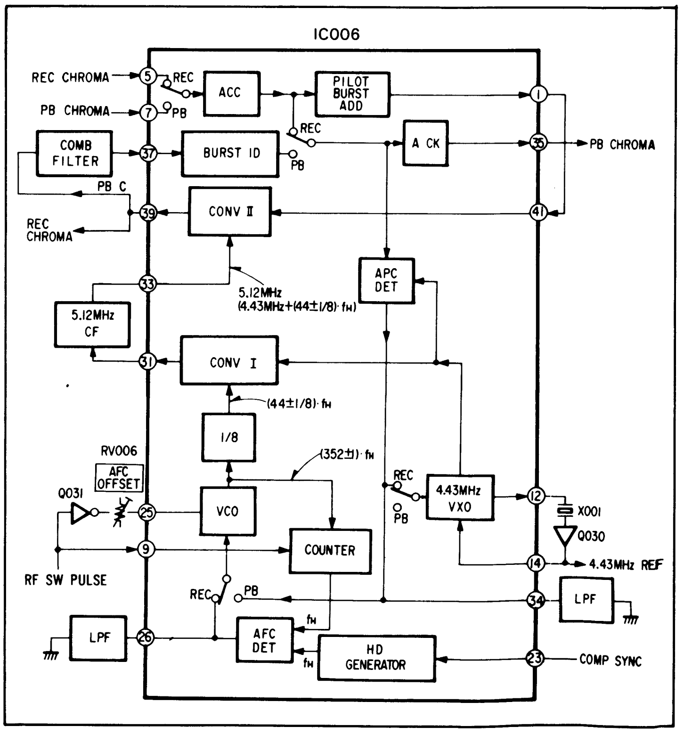

IC006
REC CHROMA
⑤
REC
ACC
PILOT BURST ADD
PB CHROMA
⑦
PB
①
REC
COMB FILTER
㊲
BURST ID
PB
A CK
㉟
PB CHROMA
PB C
㊴
CONV II
㊶
REC CHROMA
APC DET
㉝
5.12MHz
(4.43MHz+(44±1/8)·fH)
5.12MHz CF
㉛
CONV I
(44±1/8)·fH
1/8
RV006
(352±1)·fH
AFC OFFSET
REC
Q031
4.43MHz VXO
⑫
X001
㉕
VCO
PB
Q030
⑨
COUNTER
⑭
4.43MHz REF
RF SW PULSE
REC
PB
㉞
LPF
fH
LPF
㉖
AFC DET
HD GENERATOR
fH
㉓
COMP SYNC

Fig. 1-11 AFC and APC System (PAL Mode) Diagram

PB System

The VXO serves as a 4.43MHz fixed oscillator. The PB chroma signal input at pin ⑦ is converted to a 4.43MHz chroma signal in the converter II, flows through the comb filter connected across pins (39) and (37) , and is input to the APC DET via the burst ID circuit. In the APC DET, the chroma signal is phase-shift-detected with the 4.43MHz reference signal during the pilot burst period, and the error voltage is input to the VCO via the LPF pin (34) . As a result, the VCO frequency is corrected so that the 4.43 MHz chroma signal frequency after the frequency conversion in converter II conforms to the 4.43MHz reference signal. In this way, jitter is eliminated

1-1-9. AFC System (SECAM)

In the SECAM mode, the PAL system is not used, and the VXO is used as a fixed frequency oscillator, and the AFC system operation is similar to the PAL REC.

During the PB, the jitter component of COMP SYNC is brought into the 5.12MHz frequency conversion carrier unchanged. In the converter II, the jitter component in the low conversion chroma signal input from pin (41) and that in the 5.12MHz frequency converted carrier cancel each other, and the chroma signal output from pin (39) is free from jitter.

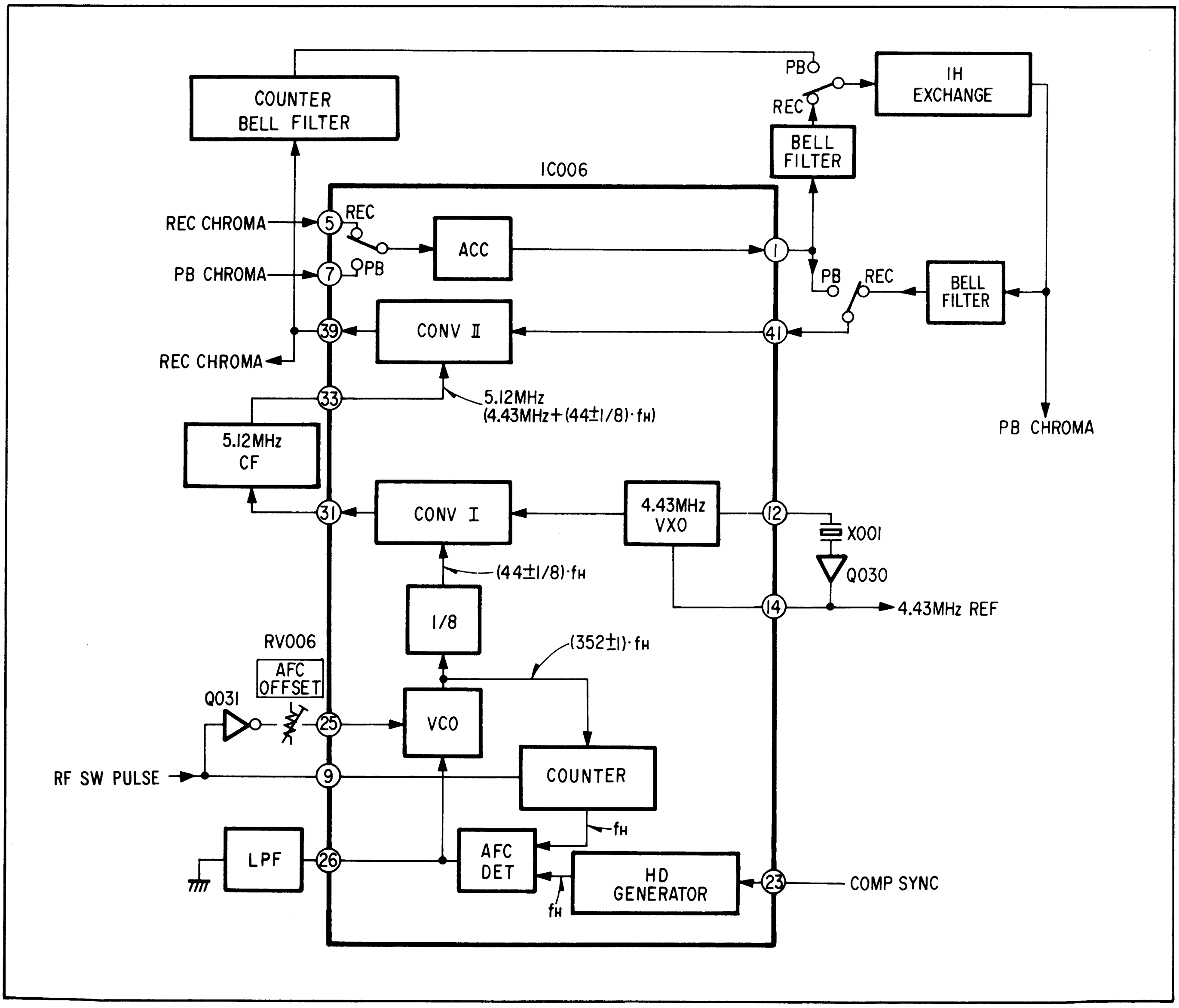
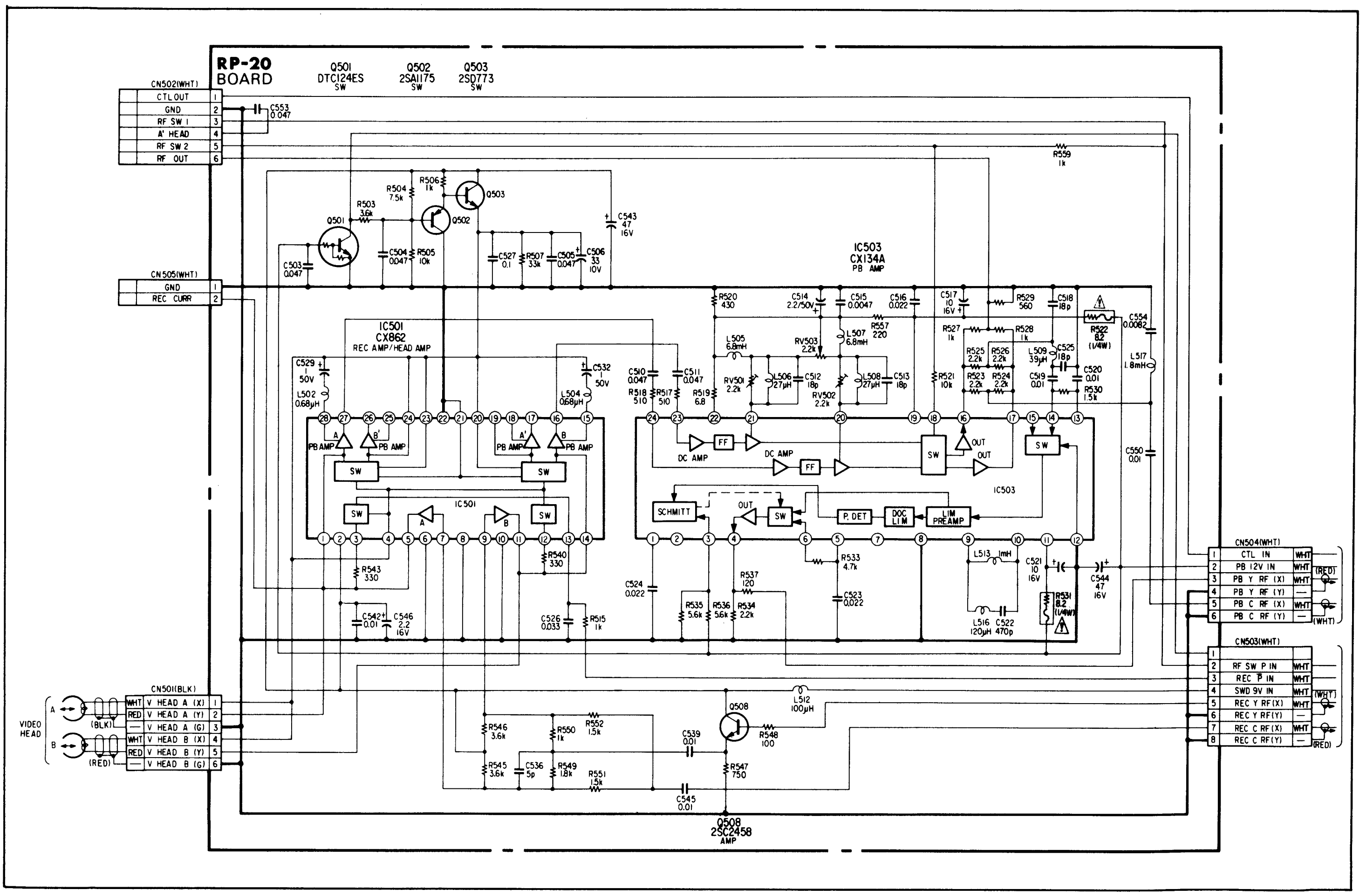

COUNTER BELL FILTER
PB
REC
IH EXCHANGE
BELL FILTER
IC006
REC CHROMA
5
REC
ACC
1
PB CHROMA
7
PB
PB
REC
BELL FILTER
39
CONV II
41
REC CHROMA
33
5.12MHz (4.43MHz+(44±1/8)·fH)
PB CHROMA
5.12MHz CF
31
CONV I
4.43MHz VXO
12
X001
Q030
(44±1/8)·fH
1/8
14
4.43MHz REF
RV006
(352±1)·fH
AFC OFFSET
Q031
25
VCO
RF SW PULSE
9
COUNTER
fH
LPF
26
AFC DET
HD GENERATOR
23
COMP SYNC
fH

Fig. 1-12 AFC System (SECAM Mode) Diagram

1-2. RP-20 BOARD

1-2-1. Video Signal Recording System

The Y-FM signal input to the RP-20 Board are fed to the buffer Q508 and are divided in R549 and R550, to be input to the Ach recording Amp (pin ⑦ of IC501) and Bch recording Amp (pin ⑨ of IC501). Chroma signals are also input to these amplifiers after being divided by R551 and R552, and Y and chroma signals are mixed. The mixed signals are amplified by the respective recording amplifiers and are fed to the video head.



RP-20 BOARD
Q501 DTC124ES SW
Q502 2SA1175 SW
Q503 2SD773 SW
CN502(WHT)
1 CTL OUT
2 GND
3 RF SW 1
4 A' HEAD
5 RF SW 2
6 RF OUT
C553 0.047
R503 3.6k
R504 7.5k
R505 10k
R506 1k
C503 0.047
C504 0.047
C527 0.1
R507 33k
C505 0.047
C506 33 10V
C543 47 16V
CN505(WHT)
1 GND
2 REC CURR
IC501 CX862 REC AMP/HEAD AMP
C529 1 50V
L502 0.68μH
C532 1 50V
L504 0.68μH
PB AMP
A
B'
A'
B
SW
IC501
R543 330
R540 330
C542 0.01
C546 2.2 16V
C526 0.033
R515 1k
IC503 CX134A PB AMP
R520 430
C514 2.2/50V
C515 0.0047
C516 0.022
R557 220
C517 10 16V
R529 560
C518 18p
R559 1k
R527 1k
R528 1k
R525 2.2k
R526 2.2k
R523 2.2k
R524 2.2k
L509 39μH
C525 18p
C519 0.01
C520 0.01
R530 1.5k
R522 8.2 (1/4W)
C554 0.0082
L517 1.8mH
C550 0.01
C510 0.047
C511 0.047
R518 510
R517 510
R519 6.8
L505 6.8mH
RV501 2.2k
L506 27μH
C512 18p
RV503 2.2k
L507 6.8mH
RV502 2.2k
L508 27μH
C513 18p
R521 10k
DC AMP
FF
OUT
SW
IC503
SCHMITT
P. DET
DOC LIM
LIM PREAMP
C524 0.022
R535 5.6k
R536 5.6k
R534 2.2k
R537 120
R533 4.7k
C523 0.022
L513 1mH
L516 120μH
C522 470p
C521 10 16V
R531 8.2 (1/4W)
C544 47 16V
CN504(WHT)
1 CTL IN WHT
2 PB 12V IN WHT
3 PB Y RF (X) WHT
4 PB Y RF (Y) —
5 PB C RF (X) WHT
6 PB C RF (Y) —
(RED)
(WHT)
CN503(WHT)
1
2 RF SW P IN WHT
3 REC P̄ IN WHT
4 SWD 9V IN WHT
5 REC Y RF(X) WHT
6 REC Y RF(Y) —
7 REC C RF(X) WHT
8 REC C RF(Y) —
(WHT)
(RED)
VIDEO HEAD
A
B
(BLK)
(RED)
CN501(BLK)
WHT V HEAD A (X) 1
RED V HEAD A (Y) 2
— V HEAD A (G) 3
WHT V HEAD B (X) 4
RED V HEAD B (Y) 5
— V HEAD B (G) 6
R546 3.6k
R545 3.6k
C536 5p
R550 1k
R549 1.8k
R552 1.5k
R551 1.5k
Q508
L512 100μH
C539 0.01
R548 100
R547 750
C545 0.01
Q508 2SC2458 AMP

Fig. 1-13 Video Signal REC/PB Process Circuit Diagram

1-2-2. Video Signal Playback System

The signals played back by the A and B ch video heads are amplified by playback head amplifier IC501 and are input to IC503. The signals are adjusted by the equalizer amplifier for playback frequency characteristic and to achieve a balance between A and B chs. The overlapping portion of the A and B ch signals is removed in the switching circuit by an RF SW PULSE, and the signals are output from pin ⑰ (Ach) and pin ⑯ (Bch). The signals are then divided into Y and chroma signal systems. The chroma signal system signals are mixed in R523 and R524 and are output to the YC-31 Board. The Y signal system signals are mixed in R525 and R526 and are reinput to pin ⑭ after being fed to the LPF. The signals are then output to YC-31 Board from pin ④ after being amplified inside the IC.

1-3. CIRCUIT FOR NOISELESS STILL PLAYBACK (SL-F60 Series)

1-3-1. Playback Head Selection Circuit (RP-20 Board)

(Playback mode other than noiseless still)

The level of the A' HEAD signal is "L", and Q510 is switched OFF. Therefore, the phase of the RF SW PULSE is inverted by pins ⑳ of IC501 and ⑱ of IC503, and by Q504, and is input to pin ⑩ of IC502.
Therefore, the Ach head output is output to the YC-31 Board when the level of the RF SW PULSE is "L", and the Bch head output is output to the YC-31 Board when the level of the RF SW PULSE is "H".

(Noiseless still playback mode)

The level of the A' HEAD signal is "H", and Q510 switches ON. The levels of pin ⑳ of IC501 and of pin ⑱ of IC503 both change to "L". Therefore, the head is selected by IC502. The A'ch head output is output to the YC-31 Board when the levels of the RF SW PULSE and of Ach head output are "L" and "H", respectively.

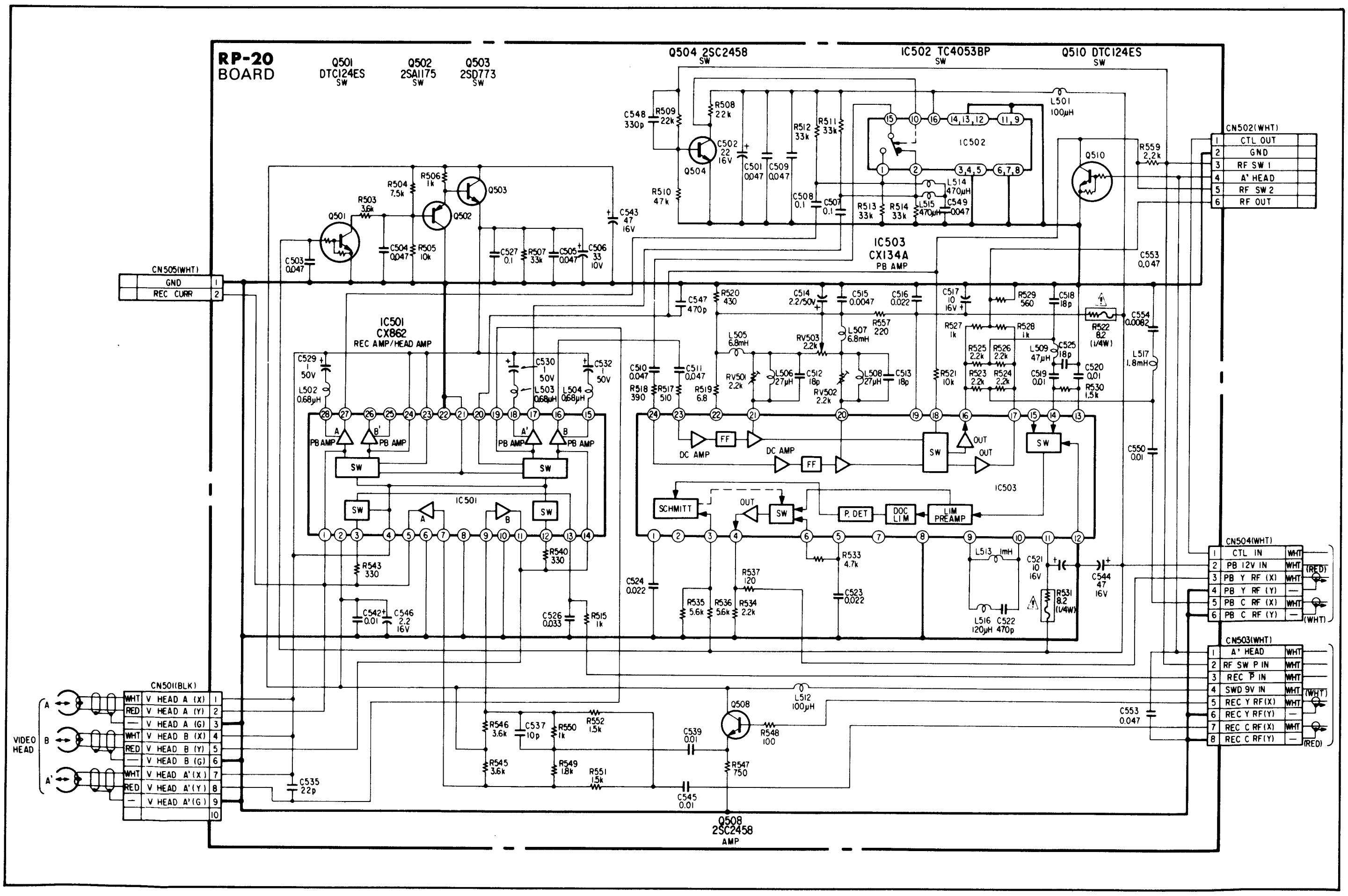

RP-20 BOARD
Q501 DTC124ES SW
Q502 2SA1175 SW
Q503 2SD773 SW
Q504 2SC2458 SW
IC502 TC4053BP SW
Q510 DTC124ES SW
IC501 CX862 REC AMP/HEAD AMP
IC503 CX134A PB AMP
Q508 2SC2458 AMP
CN505(WHT)
GND
REC CURR
CN502(WHT)
CTL OUT
GND
RF SW 1
A' HEAD
RF SW 2
RF OUT
CN504(WHT)
CTL IN
PB 12V IN
PB Y RF (X)
PB Y RF (Y)
PB C RF (X)
PB C RF (Y)
CN503(WHT)
A' HEAD
RF SW P IN
REC P IN
SWD 9V IN
REC Y RF(X)
REC Y RF(Y)
REC C RF(X)
REC C RF(Y)
CN501(BLK)
V HEAD A (X)
V HEAD A (Y)
V HEAD A (G)
V HEAD B (X)
V HEAD B (Y)
V HEAD B (G)
V HEAD A'(X)
V HEAD A'(Y)
V HEAD A'(G)
VIDEO HEAD
A
B
A'

Fig. 1-14

1-3-2. Drop Out Compensation Circuit (YC-31 Board)

The DOC PULSE output by the drop out detection circuit output (pin ㉘ of IC009) detects noise.

The SL-F30 Series disables output of the DOC PULSE by changing the level of pin ㉖ of IC009 to "H" by the MC signal during the PB PAUSE mode to inhibit drop out compensation operation. The drop out detection sensitivity is increased with the SL-F60 Series during the change from the PB mode to the PB PAUSE mode in order to detect the noise position. Drop out is compensated after completing the change by resetting to the same senstivity as that of the PB mode. The various modes are described below.

PB Mode:

The levels of the MC, DOC PAUSE, and A' HEAD signals are all "L", and Q602, Q603, and D023 are all switched OFF.

The voltage set by RV010 is input to pin ㉖ of IC009.

During transition from PB to PB PAUSE mode:

The levels of the MC, DOC PAUSE, and A' HEAD signals are "H", "H", and "L". Q602 and Q603 are switched ON, and D023 is switched OFF. The voltage set by RV010 is input to pin ㉖ of IC009 after being divided by R312 and R602. Therefore, the drop out detection sensitivity increases and the DOC PULSE width widents.

When transition is completed: Noiseless still playback mode:

The levels of the MC, DOC PAUSE, and A' HEAD signals are "H", "L", and "H", respectively. Q602 is switched ON, while Q603 and D023 are switched OFF. The voltage set by RV010 is input to pin ㉖ of IC009. Therefore, the drop out detection sensitivity equals that of the PB mode.

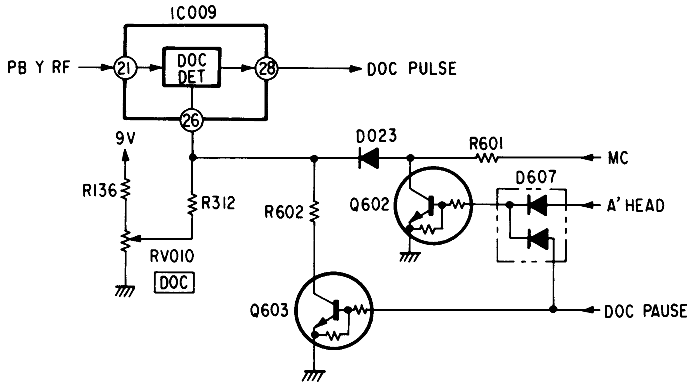

IC009
PB Y RF
㉑
DOC DET
㉘
DOC PULSE
㉖
9V
D023
R601
MC
R136
R312
R602
Q602
D607
A' HEAD
RV010
DOC
Q603
DOC PAUSE

Fig. 1-15

1-3-3. ½fH Shift Return Circuit (YC-31 Board)

DC level variations of the Y signal in vertical synchronization during the PB mode caused by ½fH shift processing during recording is cancelled by inputting an RF SW PULSE to the collector of Q051 in the de-emphasis circuit by dividing its voltage by R281, R635, and R205. This signal processing is not required when playbacking only those tracks that are recorded by the Ach head as in noiseless still playback, and the RF SW PULSE is cancelled by Q604.

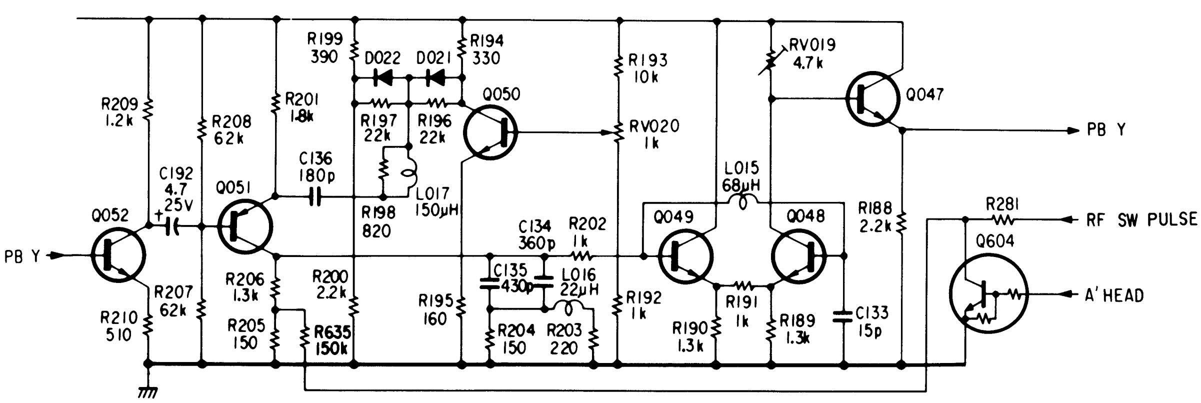
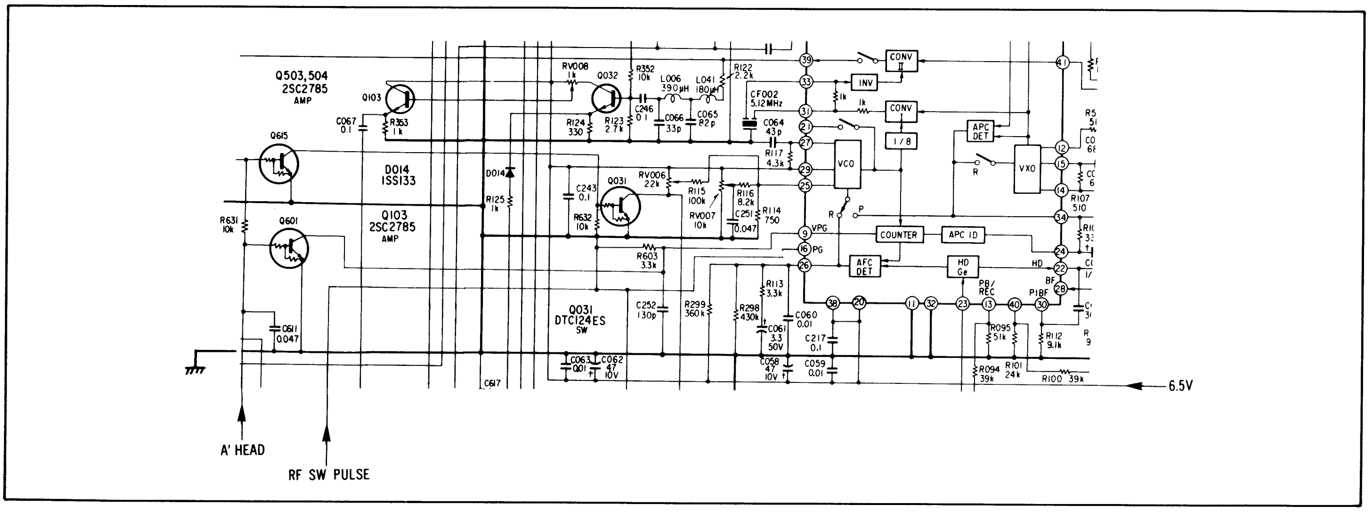

D022,021 ISS133
R199 390
D022
D021
R194 330
R209 1.2k
R208 62k
R201 1.8k
R197 22k
R196 22k
Q050
R193 10k
RV019 4.7k
Q047
RV020 1k
PB Y
C136 180p
C192 4.7 25V
Q051
L017 150µH
L015 68µH
Q052
R198 820
C134 360p
R202 1k
Q049
Q048
R188 2.2k
R281
RF SW PULSE
Q604
PB Y
R206 1.3k
R200 2.2k
C135 430p
L016 22µH
R207 62k
R195 160
R192 1k
R191 1k
A' HEAD
R210 510
R205 150
R635 150k
R204 150
R203 220
R190 1.3k
R189 1.3k
C133 15p

Fig. 1-16

1-3-4. APC and AFC Circuits (YC-31 Board)

The frequencies of the low frequency conversion chroma signals differ between the tracks recorded by the Ach and Bch heads. For this, an RF SW PULSE is applied to pin⑨of IC006 and Q031 to change the counter demultiplication ratio and to make an offset correction of the AFC voltage in playback modes other than noiseless still playback. This operation is not required in the noiseless playback mode, and the RF SW PULSE is muted using Q601 and Q615.



Q503,504
2SC2785
AMP
Q103
Q615
Q601
R631 10k
C067 0.1
R353 1k
D014
1SS133
Q103
2SC2785
AMP
C611 0.047
D014
R125 1k
C617
RV008 1k
Q032
R352 10k
L006 390μH
L041 180μH
R122 2.2k
C246 0.1
R124 330
R123 2.7k
C066 33p
C065 82p
CF002 5.12MHz
C064 43p
R117 4.3k
C243 0.1
R632 10k
Q031
RV006 22k
R115 100k
R116 8.2k
RV007 10k
C251 0.047
R114 750
R603 3.3k
Q031
DTC124ES
SW
C252 130p
R299 360k
R298 430k
R113 3.3k
C061 3.3 50V
C060 0.01
C217 0.1
C063 0.01
C062 47 10V
C058 47 10V
C059 0.01
CONV II
INV
CONV
1/8
VCO
APC DET
VXO
COUNTER
APC ID
AFC DET
HD Ge
VPG
PG
R
P
HD
BF
PB/REC
PIBF
R107 510
R095 51k
R112 9.1k
R094 39k
R101 24k
R100 39k
1k
A' HEAD
RF SW PULSE
6.5V

Fig. 1-17

2. SYSTEM CONTROL CIRCUIT

2-1. CONFIGURATION

The system control circuit consists of SS-34, FU-25*[1] RD-20, RD-21, and N Boards centering the microcomputer IC601 (MB88551).

Its peripheral circuits consist of the tape end and top sensor, loading motor drive, and solenoid drive circuits. The SL-F60 series additionally has a noise pulse detection circuit for noiseless still playback and a timing control circuit (ES-3 Board).

*[1] : FU-35 Board with the SL-F60 series.

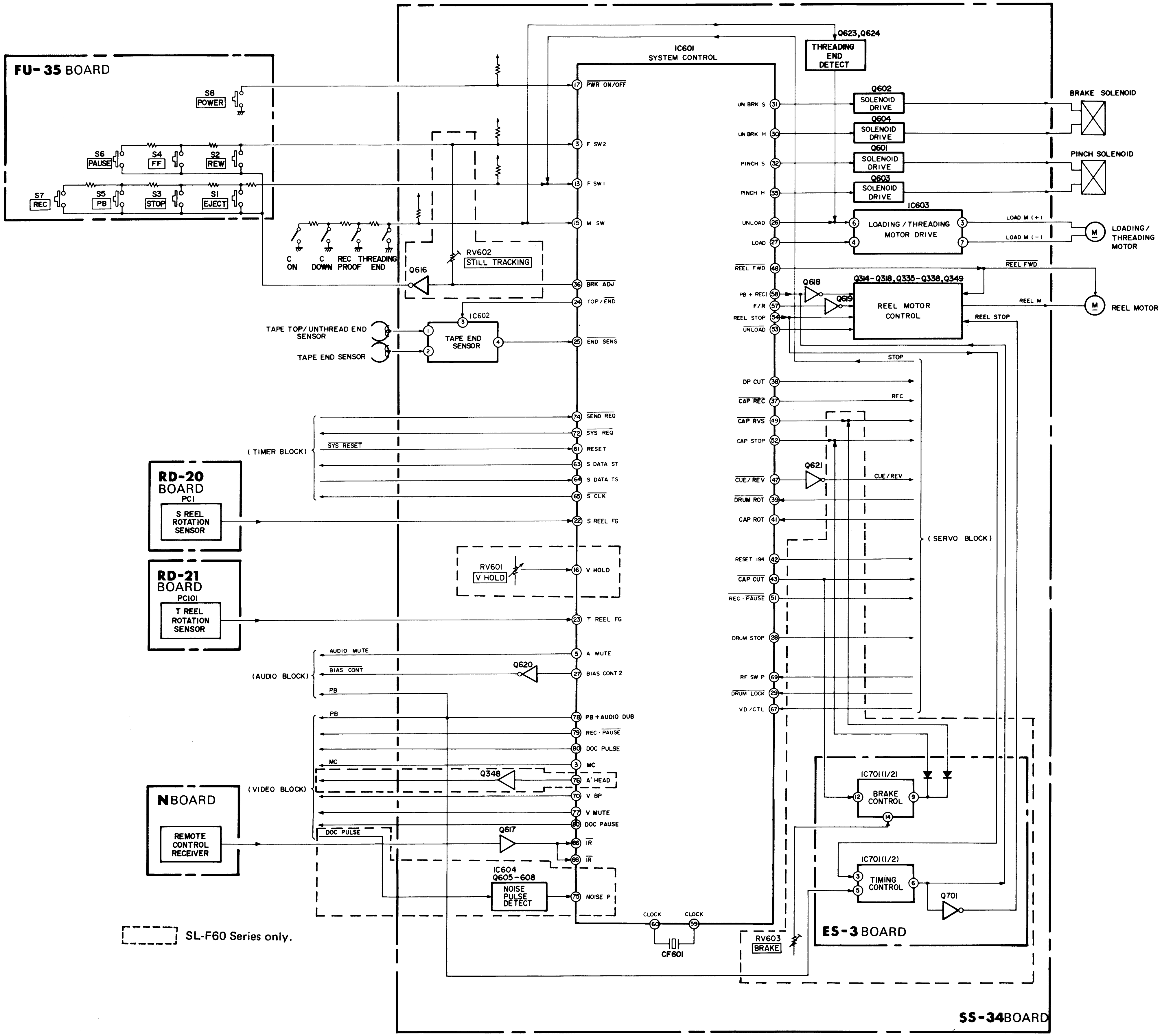

FU-35 BOARD
S8 POWER
S6 PAUSE
S4 FF
S2 REW
S7 REC
S5 PB
S3 STOP
S1 EJECT
C ON
C DOWN
REC PROOF
THREADING END
Q616
RV602 STILL TRACKING
IC601 SYSTEM CONTROL
PWR ON/OFF
F SW2
F SW1
M SW
BRK ADJ
TOP/END
END SENS
TAPE TOP/UNTHREAD END SENSOR
TAPE END SENSOR
IC602 TAPE END SENSOR
(TIMER BLOCK)
SYS RESET
SEND REQ
SYS REQ
RESET
S DATA ST
S DATA TS
S CLK
RD-20 BOARD
PC1
S REEL ROTATION SENSOR
S REEL FG
RV601 V HOLD
V HOLD
RD-21 BOARD
PC101
T REEL ROTATION SENSOR
T REEL FG
(AUDIO BLOCK)
AUDIO MUTE
BIAS CONT
PB
Q620
A MUTE
BIAS CONT 2
(VIDEO BLOCK)
PB
MC
Q348
PB+AUDIO DUB
REC·PAUSE
DOC PULSE
MC
A' HEAD
V BP
V MUTE
DOC PAUSE
N BOARD
REMOTE CONTROL RECEIVER
DOC PULSE
Q617
IR
IR
IC604 Q605-608 NOISE PULSE DETECT
NOISE P
CLOCK
CLOCK
CF601
SL-F60 Series only.
Q623,Q624
THREADING END DETECT
UN BRK S
UN BRK H
PINCH S
PINCH H
Q602 SOLENOID DRIVE
Q604 SOLENOID DRIVE
Q601 SOLENOID DRIVE
Q603 SOLENOID DRIVE
BRAKE SOLENOID
PINCH SOLENOID
IC603
UNLOAD
LOAD
LOADING / THREADING MOTOR DRIVE
LOAD M (+)
LOAD M (−)
M
LOADING/ THREADING MOTOR
REEL FWD
PB + REC
F/R
REEL STOP
UNLOAD
Q618
Q619
Q314-Q318,Q335-Q338,Q349
REEL MOTOR CONTROL
REEL FWD
REEL M
REEL STOP
M
REEL MOTOR
STOP
DP CUT
CAP REC
CAP RVS
CAP STOP
REC
Q621
CUE/REV
CUE/REV
DRUM ROT
CAP ROT
(SERVO BLOCK)
RESET 1/4
CAP CUT
REC·PAUSE
DRUM STOP
RF SW P
DRUM LOCK
VD/CTL
IC701(1/2) BRAKE CONTROL
IC701(1/2) TIMING CONTROL
Q701
ES-3 BOARD
RV603 BRAKE
SS-34 BOARD

Fig. 2-1 System Control Block Diagram

2-2. LOADING CONTROL

Loading and threading have the following four switches and sensors.

i) CASSETTE ON switch
Loading of a cassette is detected.
ii) CASSETTE DOWN switch
Downing of a cassette is detected.
iii) THREADING END switch
End of threading is detected.
iv) T (TAPE TOP) sensor
Completion of unthreading is detected.

The CASSETTE ON, CASSETTE DOWN, THREADING END, and REC PROOF (error erasing prevention) switches are connected respectively and input different output voltages to pin ⑮ (M SW) of the microcomputer by ON/OFF of these switches. (See Table 2-1.) The microcomputer reads these voltages and outputs signals to the motors, etc.

1. Loading

See the timing chart in Fig. 2-2.

1) The pinch solenoid is pulled and the drive force of the loading motor is ready to be transferred to the cassette comparment when power is switched ON.
2) The CASSETTE ON switch turns on, the loading motor rotates, and the cassette is pulled down and is placed on the reel table when a cassette is inserted in the cassette compartment. The CASSETTE DOWN switch switches ON to detect that the cassette has arrived on the reel table.
3) The reel motor rotates approximately 200msec to eliminate tape sagging. The loading motor then stops.
4) The pinch solenoid turns OFF, the driving force of the loading motor is transferred to the threading ring side to rotate the loading and reel motors successively and to start threading.
5) The THREADING END switch turns on. end of threading is detected, the loading motor is driven by pulses for a short period of time after the reel motor is stopped, and threading becomes definite. The reel motor then stops to finish loading.

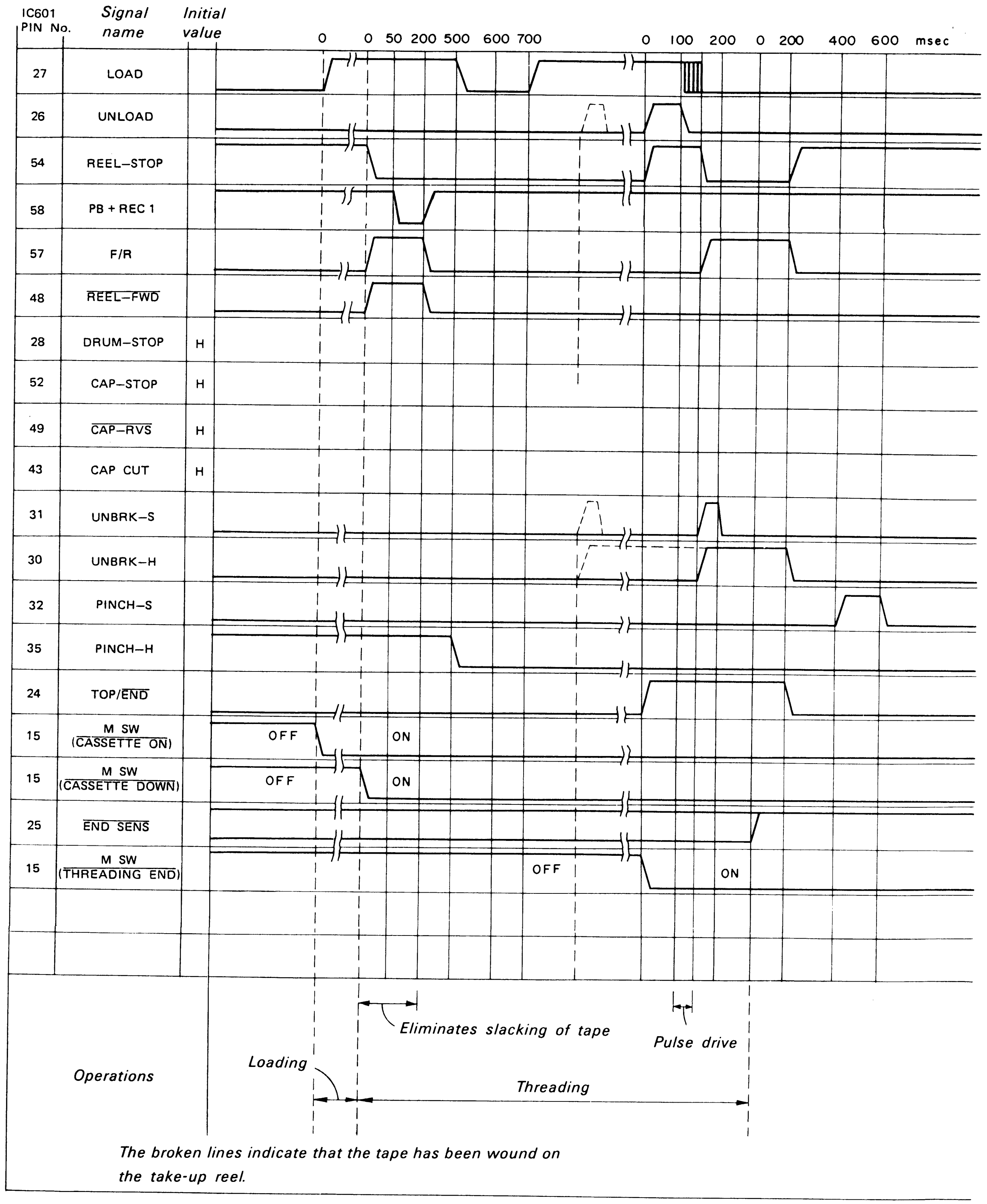
2. Unloading (Ejection)

See the timing chart in Fig. 2-3.

1) By pressing the EJECT button, a voltage (0V) is read at pin ⑬ (FSW1) of the microcomputer. The microcomputer changes the level of pin ㉔ (TOP/$\overline{\text{END}}$) to "H" at this time and reads pin ㉕ ($\overline{\text{END SENS}}$). If $\overline{\text{END SENS}}$ = "L" (TAPE TOP), the tape is fed in the FWD direction until the level of $\overline{\text{END SENS}}$ becomes "H". The loading motor then starts unthreading, and the reel motor winds the tape. The reel motor is driven by a quasiconstant current at this time.
2) The T sensor faces the No. 10 guide mechanically when unthreading completes, and the same signal as that when TAPE STOP is detected is input to the microcomputer (pin ㉕ of IC601) through IC602 to detect completion of unthreading.
3) The loading and reel motors are stopped, pinch solenoid is pulled, and the cassette is lifted by driving the loading motor.
4) The CASSETTE ON switch turns OFF, cassette ejection is detected, and unloading is finished.

Switched that are switched ON		CASSETTE ON (S904)	CASSETTE DOWN (S901-1)	REC PROOF (S902-2)	THREADING END (S903)
Voltage at pin ⑮ (M SW) of IC601	5V	3V	2V	1V	0V

Table 2-1


IC601 PIN No.
Signal name
Initial value
0 0 50 200 500 600 700
0 100 200 0 200 400 600 msec
27 LOAD
26 UNLOAD
54 REEL–STOP
58 PB + REC 1
57 F/R
48 REEL–FWD
28 DRUM–STOP H
52 CAP–STOP H
49 CAP–RVS H
43 CAP CUT H
31 UNBRK–S
30 UNBRK–H
32 PINCH–S
35 PINCH–H
24 TOP/END
15 M SW (CASSETTE ON)
OFF
ON
15 M SW (CASSETTE DOWN)
OFF
ON
25 END SENS
15 M SW (THREADING END)
OFF
ON
Operations
Loading
Eliminates slacking of tape
Pulse drive
Threading

The broken lines indicate that the tape has been wound on the take-up reel.

Fig. 3-2. Loading operation timing chart

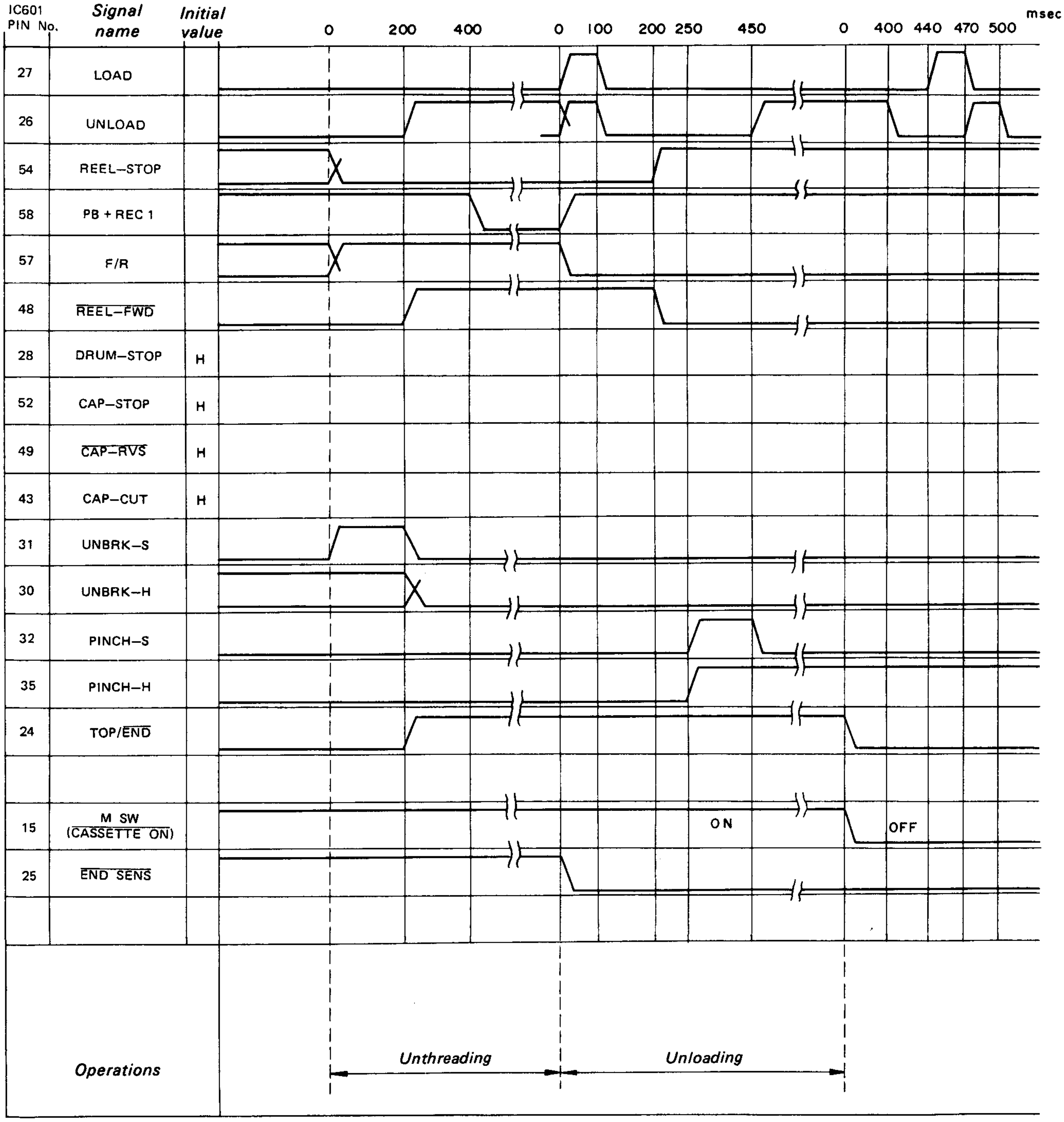

IC601 PIN No.
Signal name
Initial value
0
200
400
0
100
200
250
450
0
400
440
470
500
msec
27 LOAD
26 UNLOAD
54 REEL–STOP
58 PB + REC 1
57 F/R
48 REEL–FWD
28 DRUM–STOP H
52 CAP–STOP H
49 CAP–RVS H
43 CAP–CUT H
31 UNBRK–S
30 UNBRK–H
32 PINCH–S
35 PINCH–H
24 TOP/END
15 M SW (CASSETTE ON)
ON
OFF
25 END SENS
Operations
Unthreading
Unloading

Fig. 3-3. Unloading operation timing chart

2-3. MODE TRANSITION CHANGE

Transition to the PB, REC, FF, REW, CUE, REV, and PB PAUSE modes is described. See the block diagram in Fig. 2-1.

1. PLAY Mode

1) By pressing the PB button, the required voltage (approx. 2V) is input to pin ⑬ of the microcomputer (IC601) to set up the PLAY mode. First, the mute signals of audio and video are output from pins ⑤ and (77) in the "H" level to mute the audio and video outputs. The capstan and drum motors are then rotated. Pin (78) outputs PB + AUDIO DUB to notify each block that the PB mode has been set up.
2) Pins ㉚ and ㉛ of the microcomputer (IC601) output an unbrake signal to release reel braking. Pins ㉜ and ㉟ output a PINCH SOLENOID ON signal to press the pinch roller to the capstan.
3) The reel motor starts rotating. Video and audio muting is released in 2.8 and 3.3 seconds after pressing the PB button to complete the transition to the PLAY mode.

2. REC Mode

1) By pressing the REC button, the required voltage (approx. 3V) is input to pin ⑬ of the microcomputer (IC601) to set up the REC mode. First, the REC signal is output from pin ㊲ in the "H" level to notify the servo block that the REC mode has been set up.
2) The drum motor, capstan motor, reel motor, pinch solenoid, and brake solenoid operate in the same sequence as that in the PB mode.
3) The level of pin ㉙ ($\overline{\text{DRUM LOCK}}$) of the microcomputer (IC601) changes to "L", and the levels of pin (51) (REC. $\overline{\text{PAUSE}}$) and of pin (79) (REC. $\overline{\text{PAUSE}}$) change to both "H" successively, to start recording of CTL and video signals when the drum motor servo mechanism locks. In 200msec, the level of pin (55) BIAS CONT 2 changes to "H" to start recording voice signals and to complete the transition to the REC mode.

3. FF Mode

1) Pin ⑤ of the microcomputer (IC601) outputs an audio mute signal in the "H" level to mute the audio output when the FF button is pressed.
   At the same time, the reel brake solenoid is switched ON by the output of pins ㉚ and ㉛ .
2) In 200msec after the FF button is pressed, the level of pin (54) (REEL STOP) changes to L and that of pin (57) (F/R) changes to "H" for 500msec when the FF button is pressed. For 500msec, the drum rotates at the CUE speed, then changing to the FF speed. The level of pin ㉘ (DRUM STOP) changes to "L", the drum motor starts rotating, and the transition to the FF mode is completed.

4. REW Mode

In 200msec after the REW button is pressed, pin ㊽ ($\overline{\text{REEL FWD}}$) is output. Except for reel motor rotation in a direction opposite that in the FF mode, operation is the same as in the FF mode.

5. Picture Search Mode

Picture search operation starts when the FF or REW button is pressed during PB operation.

1) The picture search (CUE) mode is set up when the FF button is pressed during PL operation. The levels of pin ⑤ (AUDIO MUTE) and pin ③ (MC) of the microcomputer (IC601) both become "H", the audio output is muted, and video circuit is set up in the variable-speed PB mode.
2) The VD signal is inserted by outputting the VD signal generated inside the microcomputer to the video circuit from pin (70) (VBP). The level of pin ㊼ ($\overline{\text{CUE/REV}}$) changes to L, and the capstan motor and reel motor start rotating at the picture search (CUE) speed.
3) In the picture search (REV) mode, the levels of pin ㊾ ($\overline{\text{CAP RVS}}$) and of pin ㊽ ($\overline{\text{REEL FWD}}$) change to "L" and "H" respectively, while the capstan motor and reel motor rotate in a direction opposite that of CUE.

6. FR Search (Peep Search: Skip Scan) Mode

By pressing the FF or REW button during FF or REW operation, FR search operation continues while the button is kept pressed.

1) The levels of pins ⑤ (AUDIO MUTE) and ③ (MC) of the microcomputer (IC601) become "H" and "H" when the FF button is pressed during FF operation. The audio output is muted, and the video circuit sets in the variable-speed PB mode.
2) The VD signal generated inside the microcomputer is output to the video circuit from pin (70) (VBP) to insert the VD signal. The reel brake solenoid is operated instantaneously by the output of pins ㉚ and ㉛ to reduce the reel rotation speed. Then pin (57) (F/R) is changed to the "H" level to reduce the reel motor rotation speed and to set up the FR search (CUE) mode.
3) In the FR search (REV) mode, the level of pin ㊽ ($\overline{\text{REEL FWD}}$) is "H" and the reel motor rotates in a direction opposite that in the CUE mode.

2-4. TROUBLE DETECTION CONTROL

This function detects tape end, tape top, and abnormal stop of the take-up reel and maintains the set in a stop status.

1. Tape End and Tape Top Detection

This detection is performed by an S (tape end) sensor, T (tape top) sensor, and IC602 (LA7205), and their output is input to pin ㉕ of the microcomputer (END SENS). Pin ㉔ (TOP/END) selects the S and T sensors, and a sensor in accordance with the operation mode is selected.

Fig. 2-4 is a circuit diagram. Both S and T sensors are of a resonance oscillation stop type, and the oscillation level is kept to approximately 8mVp-p by the internal AGC circuit.

Pin ④ of IC602 outputs a signal of the "L" level when TAPE TOP or END is detected and oscillation is stopped. The microcomputer (IC601) changes to the STOP mode after this signal is received.

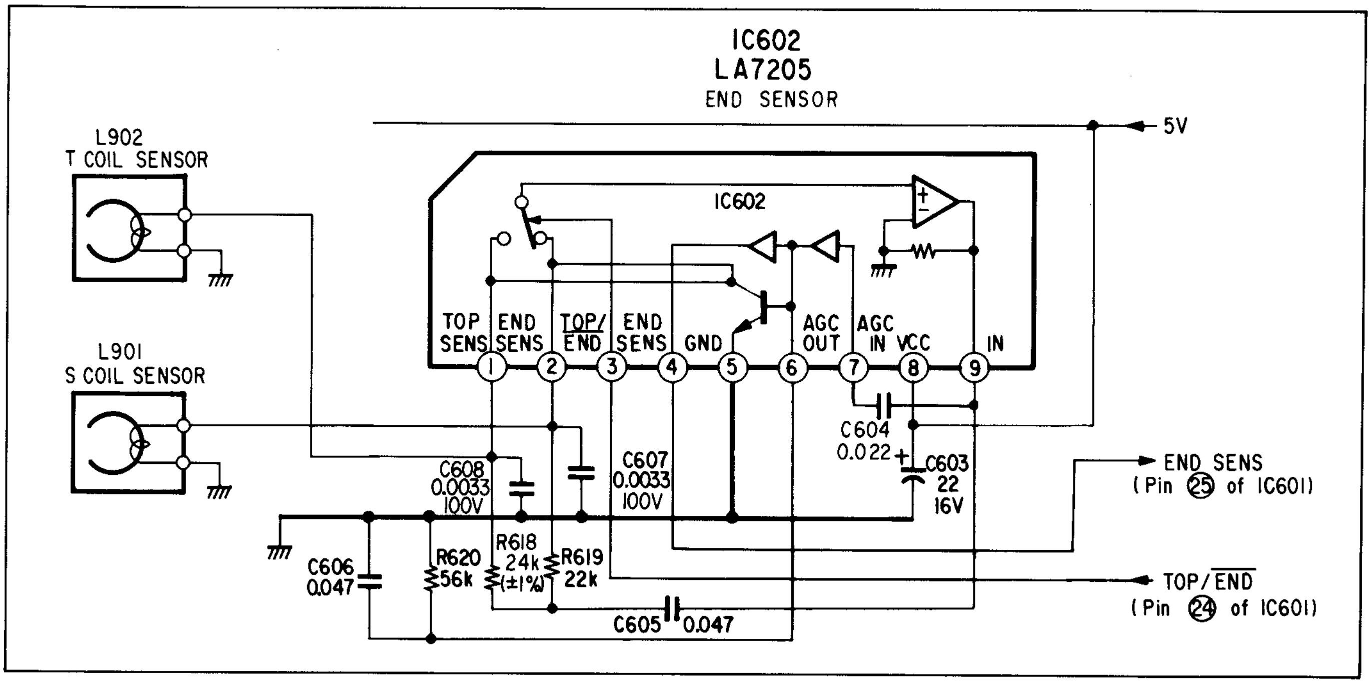

IC602
LA7205
END SENSOR
L902
T COIL SENSOR
L901
S COIL SENSOR
5V
IC602
TOP SENS
END SENS
TOP/END
END SENS
GND
AGC OUT
AGC IN
VCC
IN
1
2
3
4
5
6
7
8
9
C608 0.0033 100V
C607 0.0033 100V
C604 0.022
C603 22 16V
C606 0.047
R620 56k
R618 24k (±1%)
R619 22k
C605 0.047
END SENS (Pin ㉕ of IC601)
TOP/END (Pin ㉔ of IC601)

Fig. 2-4 Tape Top and Tape End Detection

2. Reel Rotation Detection

Reel rotation is detected by nine slits under the reel table passing a photointerrupter (PC001 or PC101) on the RD-20 or RD-21 Board. The photointerrupter output is directly input to pins ㉒ (S REEL FG) and ㉓ (T REEL FG) of the microcomputer (IC601). Reel rotation is detected faulty and the trouble stop mode is immediately set up if the signals do not change in 1.0sec.

After stopping, only the EJECT button can be operated. and the normal mode is set up after EJECT operation is completed. See Fig. 2-5 for the mechanism construction.

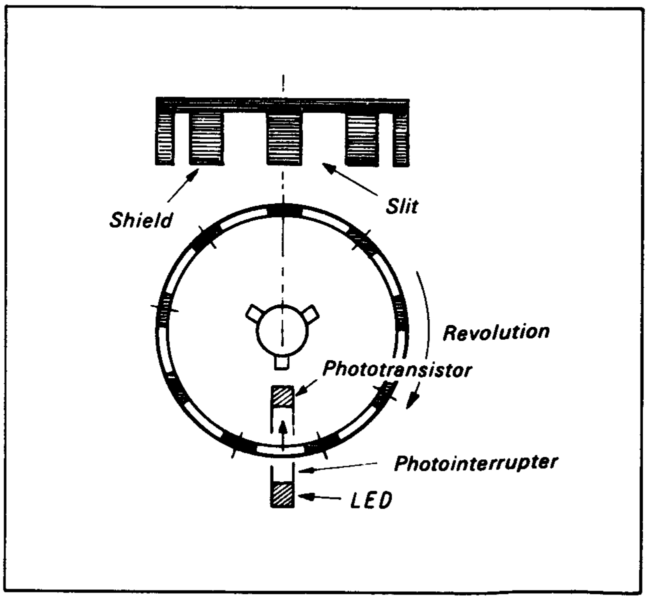

Shield
Slit
Revolution
Phototransistor
Photointerrupter
LED

Fig 2-5 Rotation Detection Mechanism

2-5. NOISELESS STILL PLAYBACK (SL-F60 Series Only)

Noiseless still is a phenomenon in which no noise is produced on the screen after completing the change from the PB mode to the PB·PAUSE mode.

Noiseless still playback is performed by detection of a playback RF signal and capstan motor control by the microcomputer (IC601) on the SS-34 Board.

The microcomputer (IC601) detects the level of a playback RF signal (PLAYBACK Y-FM signal) of Bch by RF SW PULSE (H when Bch is replayed) and DOC PULSE (H when the PLAYBACK Y-FM signal is low) and controls the capstan motor so that the playback RF signal level become minimum at the center of Bch. The microcomputer then stops the tape.

Next, the microcomputer outputs an A' HEAD signal to the video circuit and switches the circuit to use the A'ch video head instead of the Bch video head. By this, noiseless still playback is performed.

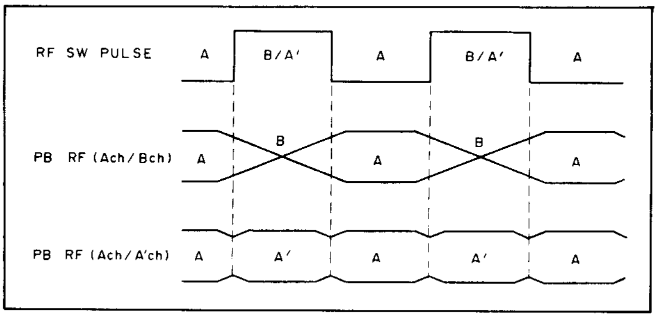
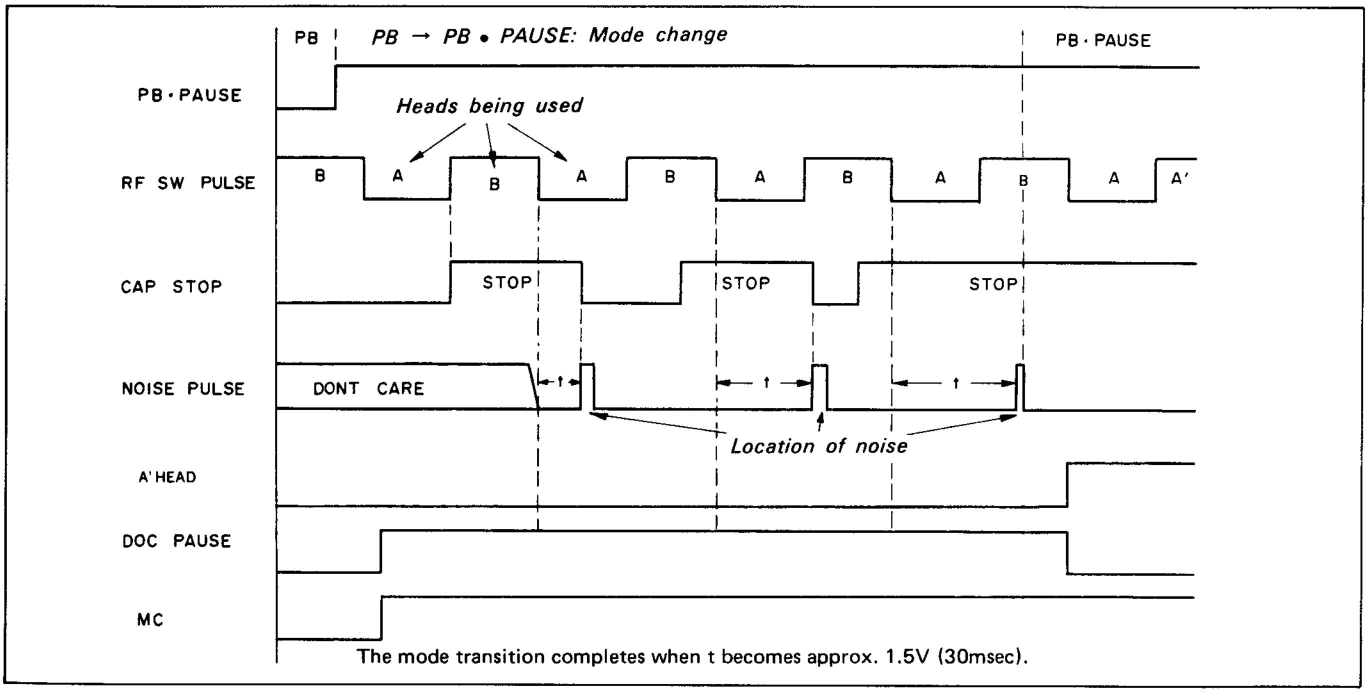


Fig. 2-6 Playback RF Signal Level



The mode transition completes when t becomes approx. 1.5V (30msec).

Fig. 2-7 PB → PB·PAUSE Timing Chart

1. Microcomputer (IC601) Operation

The microcomputer (IC601) synchronizes to the RF SW PULSE and changes the levels of pins ⑤ (AUDIO MUTE) and ③ (MC) to both "H" to change audio signal muting and video circuit to the variable-speed playback mode when the PAUSE button is pressed during the PB mode. The level of pin (80) (DOC PAUSE) is changed to "H" to increase the DROP OUT detection sensitivity, and the level of pin ㊸ (CAP OUT) is changed to "H" to discontinue capstan servo mechanism operation. The level of pin ㊾ ($\overline{\text{CAP RVS}}$) is changed to "L" for approximately 17msec to give the capstan motor a backward rotation torque to brake the capstan.

When the capstan motor stops and tape stands still, the microcomputer receives a noise pulse from the pulse detection circuit at pin (75) (NOISE P) and detects the noise position. The capstan motor is pulse driven to feed the tape in accordance with the noise deviation if noise is not at the center of Bch (a position 30msec from the rising edge of the RF SW PULSE). The noise position is then re-detected.

The level of pin (76) (A' HEAD) is changed to "H" and the video signal is played back by the A and A'ch heads when noise comes to the center of Bch by repeating pulse driving as mentioned above to set up a noiseless still playback mode. The level of pin (80) (DOC PAUSE) is returned to "L", and the DROP OUT detection sensitivity is returned to its original level.

In pulse driving, the capstan motor is driven by changing pin (52) (CAP STOP) to "L" while maintaining level of pin ㊾ ($\overline{\text{CAP RVS}}$) to "H", and the capstan motor is braked by changing the level of pin ㊾ ($\overline{\text{CAP RVS}}$) to "L" while maintaining the level of pin (52) (CAP STOP) to "L".

2. Noise Pulse Detection Circuit

The system control microcomputer (IC601 on the SS-34 Board) cannot detect the noise position directly from DOC PULSES, and the NOISE PULSE detection circuit processes these NOISE PULSES to convert them into signals that can be handled easier by the microcomputer.

The DOC PULSE (See Fig. 2-9 Ⓐ) from the YC-31 Board is compared in IC604 with the fixed voltage. (See Fig. 2-9 Ⓑ). This signal is input to a pulse stretcher circuit which charges quickly, but discharges slowly, to expand the pulse width. (See Fig. 2-9 Ⓒ .) This output is input to LPF for integration. (See Fig. 2-9 Ⓓ .) The output is fed to the pulse stretcher circuit and LPF to distinguish between the pulse generated when the playback RF signal is switched and that generated by noise, using an RF SW PULSE. Next, this output signal is divided into two parts. One part is input to the positive input of the comparator, and the other, to the negative input of the comparator through the peak hold circuit. The peak hold output (See Fig. 2-9 Ⓔ) is used as a comparison voltage, instead of the fixed voltage, in order to suppress variations of the output pulse width by level variations of the integrated waveform (See Fig. 2-9 Ⓓ) by the LPF.

By this, the comparator output (Pin ⑦ of IC604) becomes a pulse with a certain width as shown by Ⓕ in Fig. 2-9. This pulse is input to pin (75) of the microcomputer (IC 601) as a noise pulse.

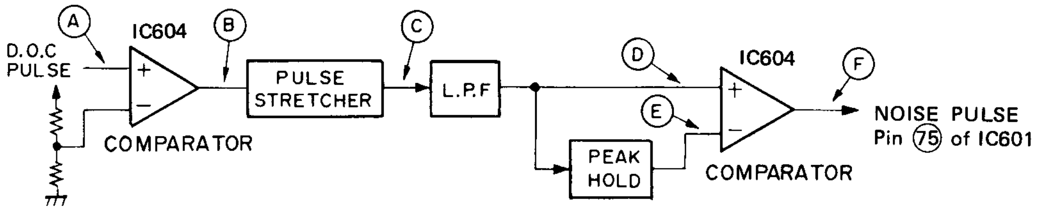

Ⓐ
D.O.C PULSE
IC604
Ⓑ
+
−
COMPARATOR
PULSE STRETCHER
Ⓒ
L.P.F
Ⓓ
Ⓔ
PEAK HOLD
IC604
+
−
COMPARATOR
Ⓕ
NOISE PULSE
Pin (75) of IC601

Fig. 2-8 Block Diagram of Noise Pulse Detection Circuit

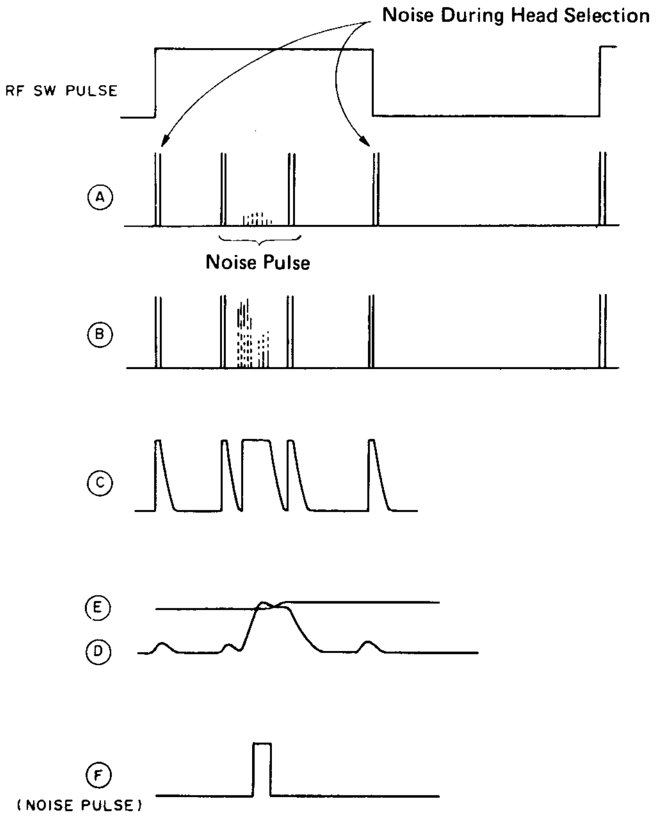

Noise During Head Selection
RF SW PULSE
Ⓐ
Noise Pulse
Ⓑ
Ⓒ
Ⓔ
Ⓓ
Ⓕ
(NOISE PULSE)

Fig. 2-9 Noise Pulse Detection Timing Chart

3. Setting of Brake Timing

The first brake timing (the time between RF SW PULSE rising edge and output of a brake pulse) is optimally set (approx. 17msec) by RV602 to reduce the transition time from the PB mode to the PB·PAUSE mode.
The voltage set by RV602 is input to pin ⑭ (FSW 2) of IC601. This pin is the input pin of the FF, REW, and STILL function switches, and the selection is performed by pin ㊱ ($\overline{\text{BRK ADJ}}$).

Normally, the level of pin ㊱ ($\overline{\text{BRK ADJ}}$) is "H", and Q616 is ON, while D607 is OFF. The function switch output voltage is input to pin ⑭ (FSW 2) of IC601. The level of pin ㊱ changes to "L" only immediately after the STILL button is pressed.
Q616 switches OFF and D607 switches ON to input the voltage set by RV602 to pin ⑭ .

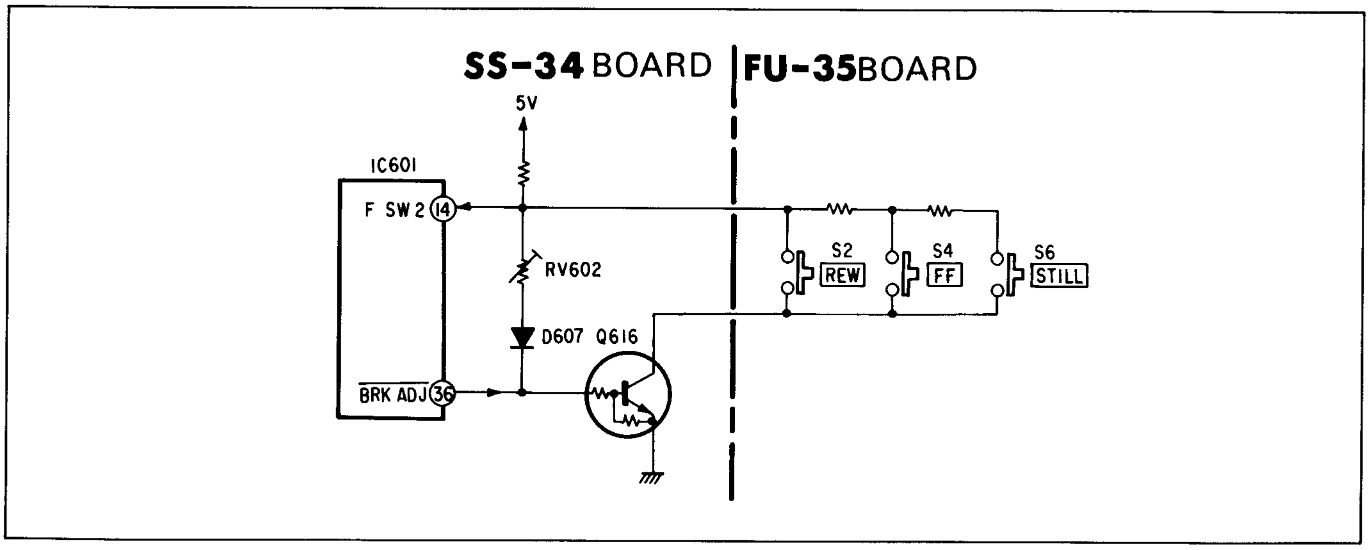

SS-34 BOARD
FU-35BOARD
5V
IC601
F SW2 ⑭
RV602
D607
Q616
BRK ADJ ㊱
S2
REW
S4
FF
S6
STILL

Fig. 2-10

4. Setting Brake Pulse Width

The width of the first brake pulse during the transition from the PB mode to the PB·PAUSE mode is set by RV603 When the PAUSE button is pressed and the level of CAP OUT (pin ㊸ of IC601) changes to "H", the monostable multi-vibrator (IC701) on the ES-3 Board is triggered by the rising edge of the level change of CAP OUT. The level of pin ⑨ changes to "L" by the time set by RV603 (approx. 16msec). During this time, the levels of CAP RVS (pin ㊾ of IC601) and CAP STOP (pin (52) of IC601) are forcibly changed to "L" to apply braking after an inverse torque applies to the capstan motor.

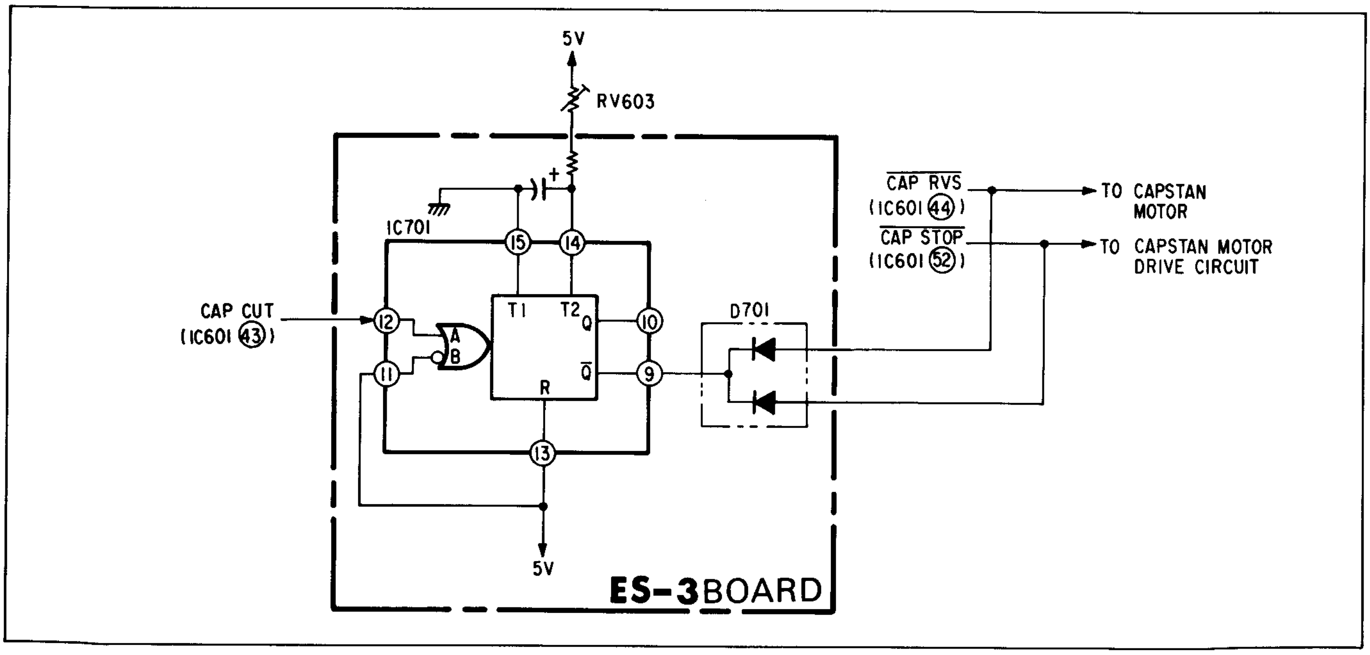

5V
RV603
IC701
⑮
⑭
CAP CUT
(IC601 ㊸)
⑫
⑪
A
B
T1
T2
Q
Q̄
R
⑩
⑨
⑬
5V
D701
CAP RVS
(IC601 ㊹)
CAP STOP
(IC601 (52))
TO CAPSTAN MOTOR
TO CAPSTAN MOTOR DRIVE CIRCUIT
ES-3BOARD

Fig. 2-11

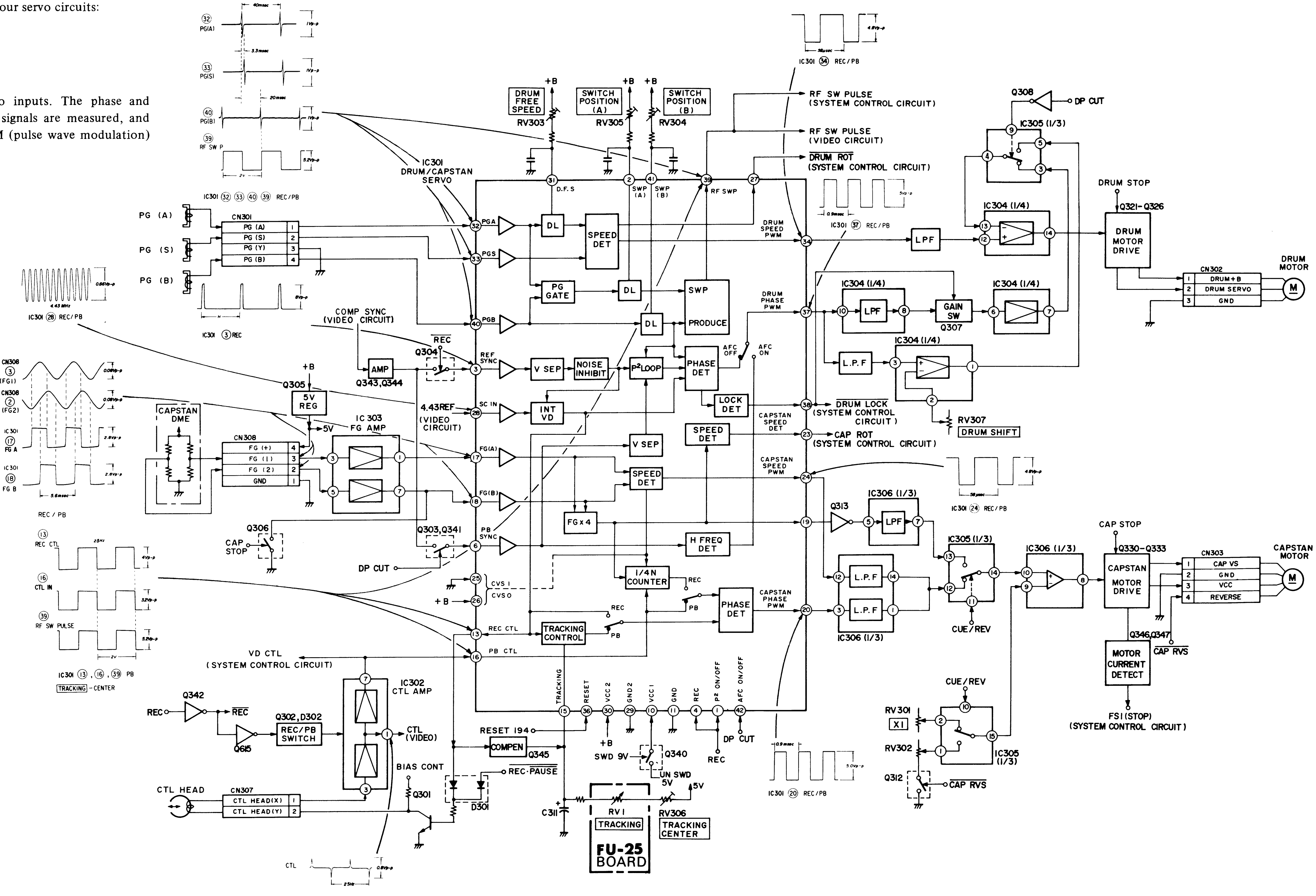
3. SERVO CIRCUIT

The servo circuit mainly consists of IC301 on the SS-34 Board, CX-194B digital servo IC.

CX-194B contains the following four servo circuits:

- ○ Drum speed system
- ○ Drum phase system
- ○ Capstan speed system
- ○ Capstan phase system

Each servo circuit requires two inputs. The phase and time differences between these signals are measured, and error outputs are output as PWM (pulse wave modulation) signals.



IC301 DRUM/CAPSTAN SERVO
PG (A)
PG (S)
PG (B)
CN301
PG (A)
PG (S)
PG (Y)
PG (B)
IC301 ㉜ ㉝ ㊵ ㊴ REC/PB
IC301 ③ REC
IC301 ㉘ REC/PB
COMP SYNC (VIDEO CIRCUIT)
REC
Q304
AMP
Q343,Q344
Q305
5V REG
IC 303 FG AMP
4.43REF (VIDEO CIRCUIT)
CAPSTAN DME
CN308
FG (+)
FG (1)
FG (2)
GND
REC / PB
Q306
CAP STOP
Q303,Q341
DP CUT
TRACKING - CENTER
VD CTL (SYSTEM CONTROL CIRCUIT)
REC
Q342
Q302,D302
REC/PB SWITCH
Q615
IC302 CTL AMP
CTL (VIDEO)
BIAS CONT
Q301
CTL HEAD
CN307
CTL HEAD(X)
CTL HEAD(Y)
D301
REC·PAUSE
RESET 194
COMPEN
Q345
C311
RV1
TRACKING
FU-25 BOARD
RV306
TRACKING CENTER
SWD 9V
Q340
UN SWD
DP CUT
REC
DRUM FREE SPEED
RV303
SWITCH POSITION (A)
RV305
SWITCH POSITION (B)
RV304
D.F.S
SWP (A)
SWP (B)
RF SWP
DL
SPEED DET
PG GATE
SWP PRODUCE
V SEP
NOISE INHIBIT
P² LOOP
PHASE DET
LOCK DET
INT VD
SPEED DET
V SEP
FG x 4
H FREQ DET
1/4N COUNTER
TRACKING CONTROL
PHASE DET
AFC OFF
AFC ON
TRACKING
RESET
VCC 2
GND2
VCC 1
GND
REC
P² ON/OFF
AFC ON/OFF
RF SW PULSE (SYSTEM CONTROL CIRCUIT)
RF SW PULSE (VIDEO CIRCUIT)
DRUM ROT (SYSTEM CONTROL CIRCUIT)
DRUM SPEED PWM
DRUM PHASE PWM
DRUM LOCK (SYSTEM CONTROL CIRCUIT)
CAP ROT (SYSTEM CONTROL CIRCUIT)
CAPSTAN SPEED DET
CAPSTAN SPEED PWM
CAPSTAN PHASE PWM
IC301 ㉞ REC/PB
IC301 ㊲ REC/PB
IC301 ㉔ REC/PB
IC301 ⑳ REC/PB
LPF
L.P.F
GAIN SW
Q307
IC304 (1/4)
RV307
DRUM SHIFT
Q308
DP CUT
IC305 (1/3)
DRUM STOP
Q321-Q326
DRUM MOTOR DRIVE
CN302
DRUM+B
DRUM SERVO
GND
DRUM MOTOR
M
Q313
IC306 (1/3)
CUE/REV
CAP STOP
Q330-Q333
CAPSTAN MOTOR DRIVE
CN303
CAP VS
GND
VCC
REVERSE
CAPSTAN MOTOR
Q346,Q347
CAP RVS
MOTOR CURRENT DETECT
FS1 (STOP) (SYSTEM CONTROL CIRCUIT)
RV301
X1
RV302
Q312
CAP RVS
IC302 ① PB
CTL

Fig. 3-1 Servo System Circuit Block Diagram

3-1. DRUM SERVO SYSTEM

The drum servo system consists of speed and phase systems. The drum speed is controlled by the fH correction circuit during CUE/REV.

3-1-1. Drum Speed System

The drum speed system controls the drum motor to obtain a constant rotation speed by detecting the time difference of two PG signals that can be obtained from PG (A) and PG (S) coils during recording and playback.

The PG (A) and (S) signals are input to pins ㉜ and ㉝ of IC301. The time difference between these PG signals is detected by the speed detection circuit and is output to pin ㉞ as a drum speed PWM signal. This drum speed PWM signal is fed to a low-pass filter consisting of R365, R367, C346, and C347 and is converted to a DC voltage. After being converted to a DC voltage, the speed error signal is input to pin ⑫ of IC304, is mixed with the phase error signal, and is output from pin ⑭ as a drum motor drive signal.

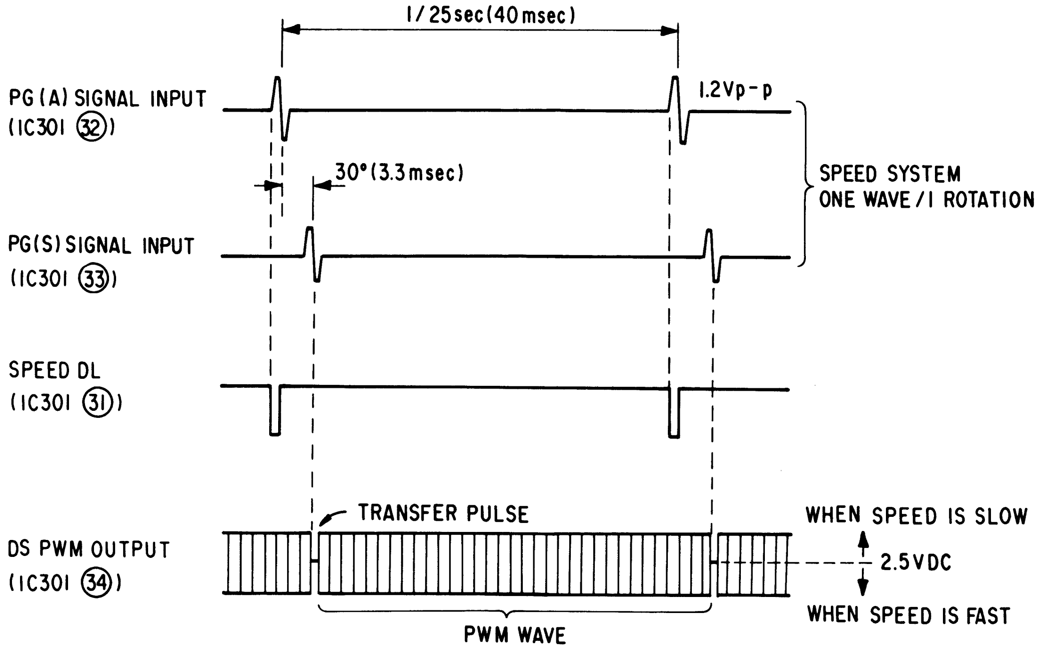


Fig. 3-2 Drum Speed System Timing Chart

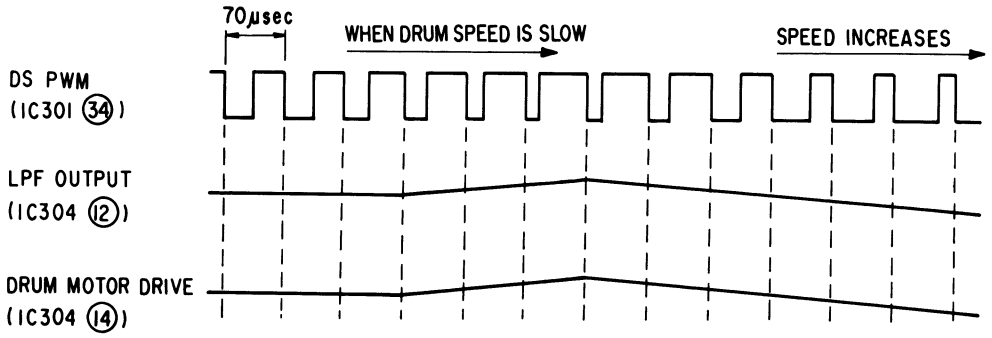
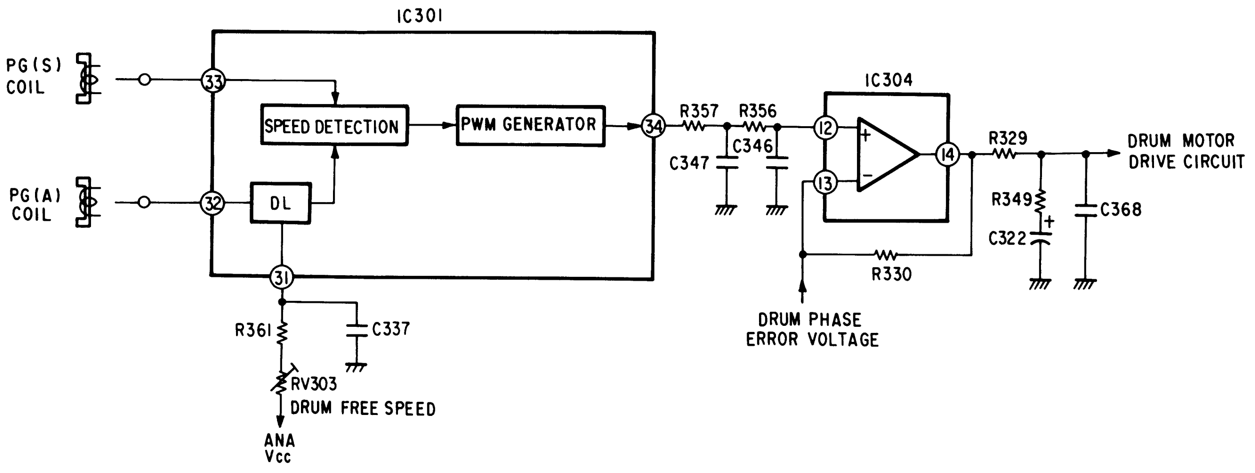


Fig. 3-3 Relationship Between DS PWM and Error Voltage



IC301
PG(S)
COIL
PG(A)
COIL
㉝
㉜
SPEED DETECTION
PWM GENERATOR
DL
㉞
㉛
R357
R356
C346
C347
IC304
⑫
⑬
⑭
R329
DRUM MOTOR
DRIVE CIRCUIT
R349
C322
C368
R330
DRUM PHASE
ERROR VOLTAGE
R361
C337
RV303
DRUM FREE SPEED
ANA
Vcc

Fig. 3-4 Drum Speed System Circuit

3-1-2. Drum Phase System

The drum phase system controls the drum to make the drum rotation phase constant.

Mode	Reference Signal	Comparison Signal
Recording	Vertical SYNC signal	PG (B) signal
Playback	INT VD	PG (B) signal

Table 3-1

During REC mode

A composite synchronising signal (COMPOSITE SYNC) is input to pin ③ of IC301, and the vertical SYNC signal is separated. The X'tal oscillator of the video circuit inputs a 4.43MHz signal to pin ㉘ and becomes INT VD after being counted down to 1/177200. This INT VD signal is reset by the vertical SYNC signal and becomes a reference signal.

The PG (B) signal from the drum is input to pin ㊵ of IC301. The phases of the reference and PG (B) signals are compared by the phase detection circuit, and the signal is output to pin ㊲ as a drum phase PWM wave.

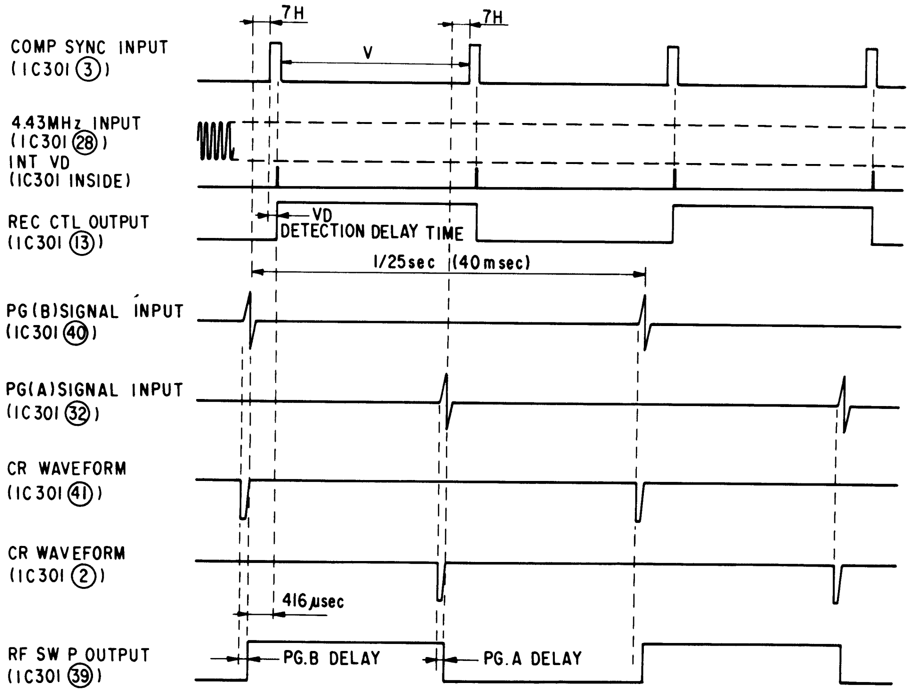


Fig. 3-5 Drum Phase System Timing Chart

During PB mode

The phases of the INT VD signal generated by counting down the 4.43MHz signal from the X'tal oscillator and of PG (B) signal are compared with the phase detection circuit, and the signals are output to pin ㊲ as a phase PWM wave.

The drum phase PWM wave is first converted to a DC voltage by an active low-pass filter (pins ⑧ , ⑨ , and ⑩ of IC304) and is output to pin ⑧ of IC304. The wave is fed to the phase compensation circuit, is input to pin ⑥ of IC304 to be inverted, and is fed to pin ⑬ of IC304 after being fed to the normal/vari-speed PB selection switch (pins ③ , ④ , and ⑤ of IC305). The wave is then mixed with the speed system voltage.

A drum lock signal is used to add R469 to R343 in parallel to increase the gain of the phase system and to quicken pulling of the phase system to improve drum rising during a change from stop to PB.

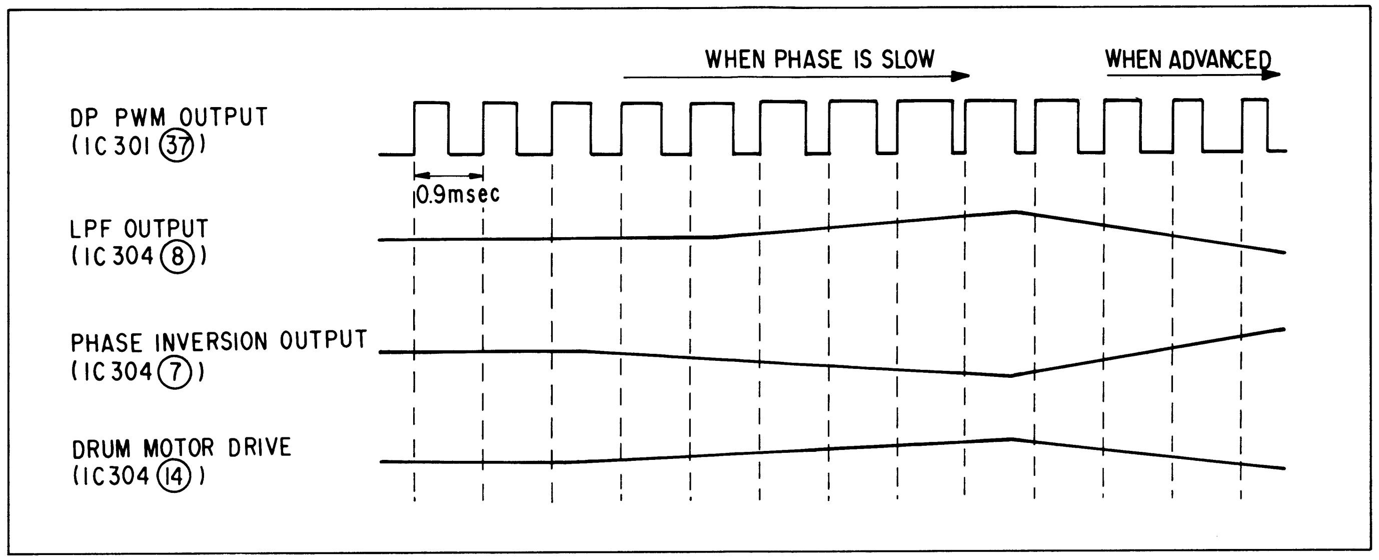


Fig. 3-6 Relationship Between DP PWM Wave and Drum Phase Error Voltage

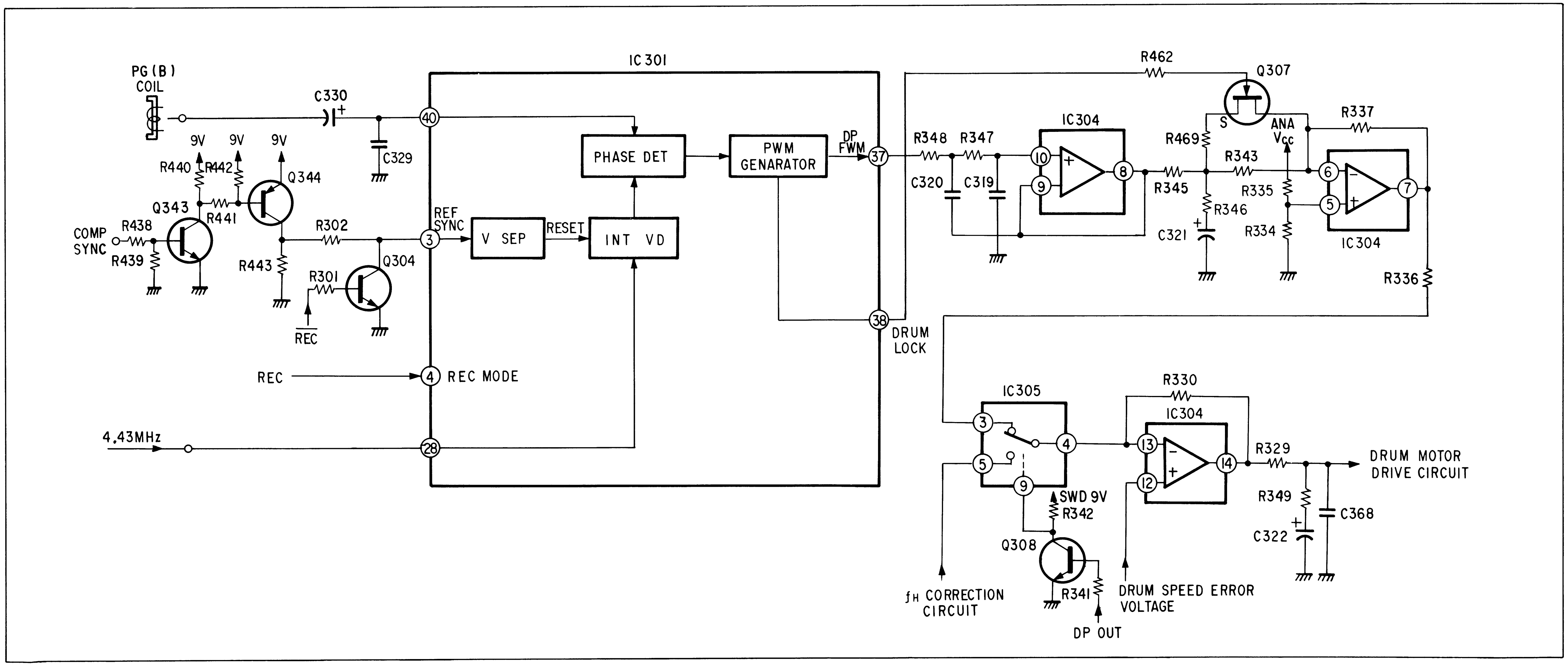

PG (B) COIL
C330
C329
9V
9V
9V
R440
R442
Q344
Q343
R441
COMP SYNC
R438
R439
R443
R302
R301
Q304
REC
REC
4.43MHz
IC301
40
REF SYNC
3
V SEP
RESET
INT VD
PHASE DET
PWM GENARATOR
DP FWM
37
38
DRUM LOCK
4
REC MODE
28
R462
Q307
S
ANA Vcc
R348
R347
C320
C319
IC304
10
9
8
R469
R343
R345
R346
C321
R335
R334
R337
6
5
7
IC304
R336
IC305
3
4
5
9
SWD 9V
R342
Q308
R341
DP OUT
fH CORRECTION CIRCUIT
R330
IC304
13
12
14
DRUM SPEED ERROR VOLTAGE
R329
R349
C322
C368
DRUM MOTOR DRIVE CIRCUIT

Fig. 3-7

3-1-3. fH Correction Circuit

1. fH correction during CUE/REV mode

The tape runs during picture search at a speed approximately nine times the normal playback speed and approximately 3 to 15 times during the F/R search mode (peep search). Therefore, the relative speeds of the head and tape greatly vary. As a result, fH (horizontal frequency) changes, and horizontal synchronization of the TV receiver cannot be secured. The fH correction circuit controls the head drum rotation speed so that fH remains in the TV SYNC range during picture search and FR search to correct the fH deviation and to obtain pictures that have balanced synchronization.

The L level is applied to pin ⑨ of IC305 during picture search and F/R search, and the circuit is selected to the fH correction side. The DP CUT signal switches Q341 ON and Q303 OFF, and COMP SYNC is input to pin ⑥ of IC301. When the level H is input to pin ㊷, the AFC circuit of IC301 switches ON. By this, the output with a constant pulse width triggered by the horizontal SYNC signal of COMP SYNC input to pin ⑥ is output from pin ㊲ as AFC OUT.

This AFC OUT signal is integrated by R344, C325, pins ①, ②, and ③ of IC304, C323, and R332, and the duty variations of AFC OUT are output from pin ① of IC304 as a DC variation component. This DC variation component is fed to the normal/vari-speed PB selection switch (pins ③, ④, and ⑤ of IC305) and is input to pin ⑬ of IC304. The component is then mixed with the drum speed error voltage, is output to pin ⑭ as a motor drive signal to control the drum rotation speed.

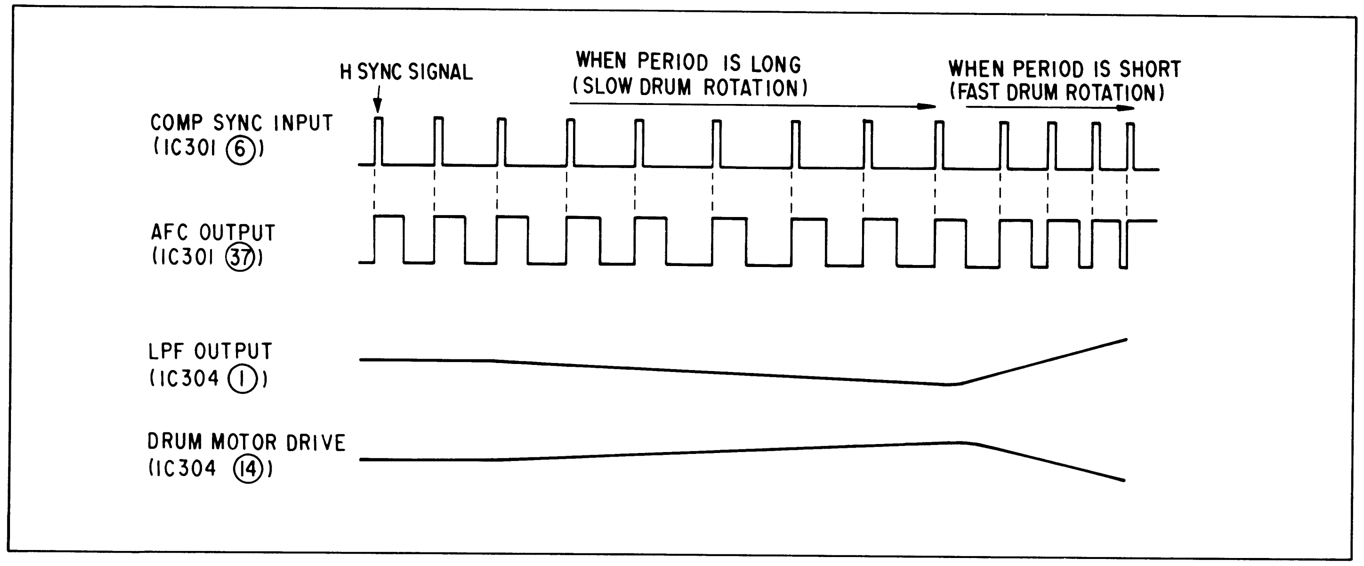


Fig. 3-8

If the COMP SYNC period during replay become long, for example, the output of pin ① of IC304 decreases, and the voltage applied the drum motor drive circuit decreases. The drum motor rotation speed increases, and the period shortens.

Thus, the fH deviation is converted to DC variations to change the drum rotation speed for correction.

2. fH correction during PB·PAUSE

(SL-F30 Series and SL-T25ME)

The same fH correction as that in the CUE/REV mode is performed.

(SL-F60 Series)

Operation is different from that for the SL-F30/T25 series because of noiseless still playback. The level of the $\overline{\text{PAUSE}}$ signal (pin (56) of IC601) changes to "L" and D318 and Q356 switch ON. As D318 switches ON, the level of pin ③ of IC304 changes to "L" and pin ①, to "L" (0Vdc). Therefore, instead of AFC OUT of the output of pin ㊲ of IC301 being cut, the fixed voltage obtained by dividing the V (+) FG power voltage by RV310 and R331 is input to pin ⑬ of IC304 and is mixed with the drum speed error voltage for fH correction. D320 compensates the temperature characteristic.

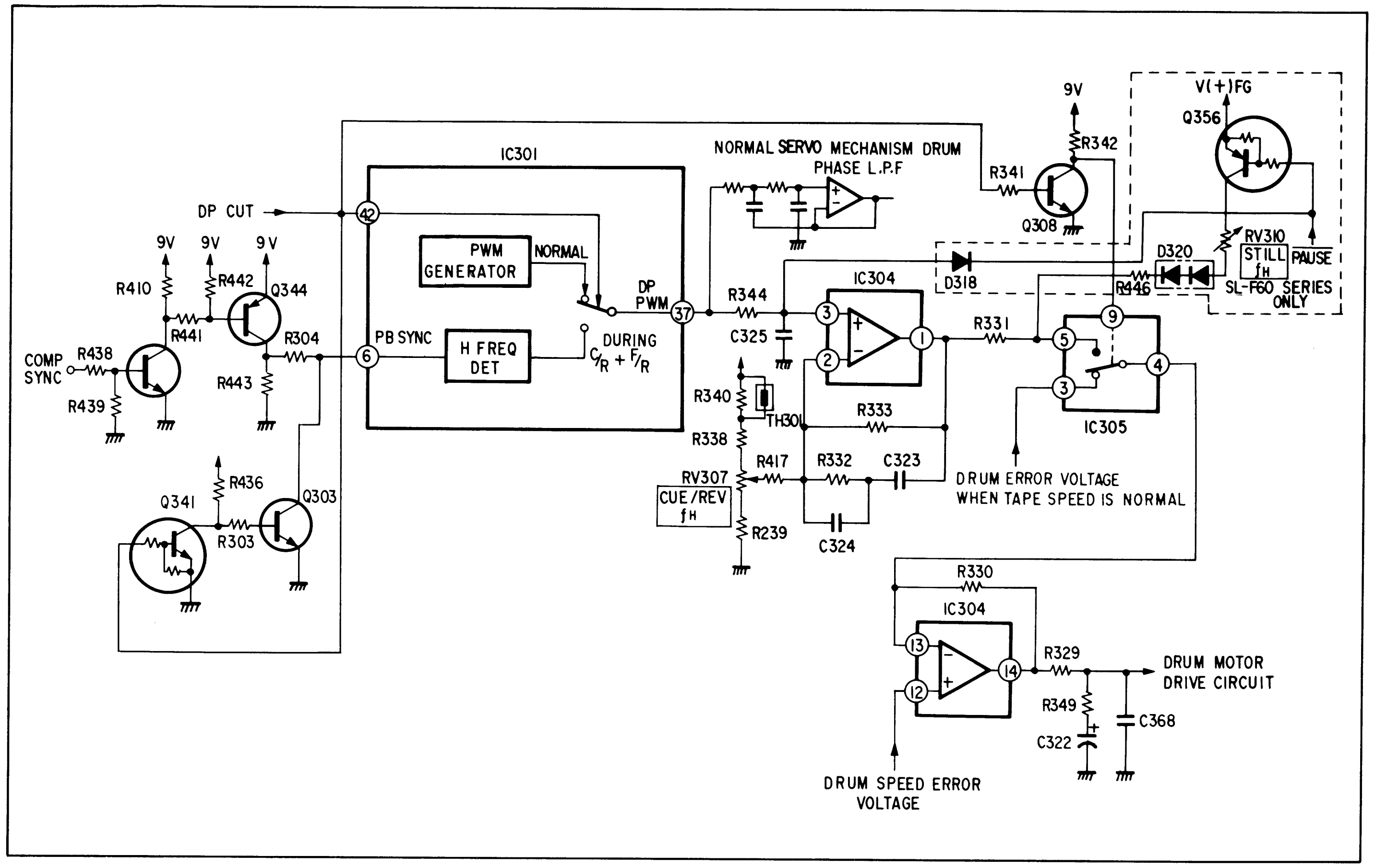

IC301
DP CUT
9V
9V
9V
R410
R442
Q344
R441
R304
COMP SYNC
R438
R439
R443
R436
Q341
Q303
R303
42
PWM GENERATOR
NORMAL
DP PWM
37
PB SYNC
6
H FREQ DET
DURING C/R + F/R
NORMAL SERVO MECHANISM DRUM PHASE L.P.F
R341
9V
R342
Q308
V(+)FG
Q356
RV310
STILL fH
PAUSE
D320
D318
R446
SL-F60 SERIES ONLY
R344
C325
IC304
3
2
1
R331
5
9
4
3
IC305
R340
TH301
R333
R338
RV307
CUE/REV fH
R417
R332
C323
R239
C324
DRUM ERROR VOLTAGE WHEN TAPE SPEED IS NORMAL
R330
IC304
13
12
14
R329
DRUM MOTOR DRIVE CIRCUIT
R349
C322
C368
DRUM SPEED ERROR VOLTAGE

Fig. 3-9 Drum fH Correction Circuit

3-2. CAPSTAN SERVO SYSTEM

As in the drum servo system, the capstan servo system consists of a speed and phase systems and controls the tape speed so that the video track and video head positions are constant.

3-2-1. Capstan Speed System

This servo system detects passing time of the FG (1) and FG (2) signals from the capstan both during recording and replaying to control the capstan motor.

First, the FG signal is detected using a DME (dividing type magnet resistance element) to detect the magnetism magnetized on the capstan motor, and a sine wave is then generated.

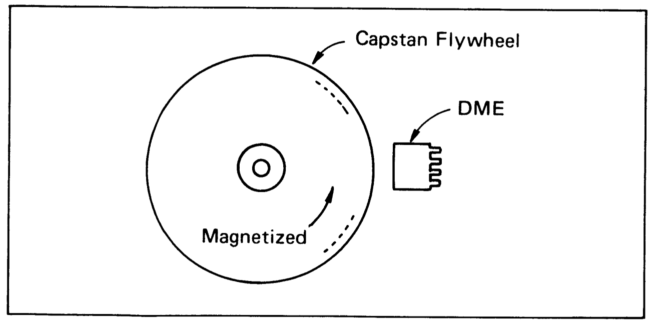

Capstan Flywheel
DME
Magnetized

Fig. 3-10

The FG (1) and (2) signals have a phase differential of 90°. The FG outputs are small and are shaped to a rectangle by an amplifier (IC303).

IC301 measures the passing time for waveform trailing edge input to pins ⑰ and ⑱, and the time is output from pin ㉔ as a capstan speed PWM wave.

The PWM wave is fed to the active low-pass filter (pins ⑫, ⑬, and ⑭ of IC306) and is converted to a DC voltage. The wave is output to pin ⑭ of IC306 and is mixed with the voltage of the phase system and is applied to pin ⑩ of IC306 after passing through the selection switch (pins ⑫, ⑬, and ⑭ of IC305.) The wave is output from pin ⑧ as a capstan drive signal.

The level of pin ⑪ of IC305 changes to "H" during CUE/REV, and the speed servo system is selected to the CUE/REV side. The output of FG, which is four times larger, from pin ⑲ of IC301 is inverted by Q313, is fed to pin ⑩ of IC306 through the active low-pass filter (pins ⑤, ⑥, and ⑦ of IC306), and is output from pin ⑧ as a capstan drive signal, to drive the capstan motor at a speed approximately nine times faster than in normal operation.

The normal and CUE/REV speeds are applied to pin ⑨ of IC306 by selecting by IC305 the capstan free speed voltage set by RV301 and RV302 to change the tape speed.

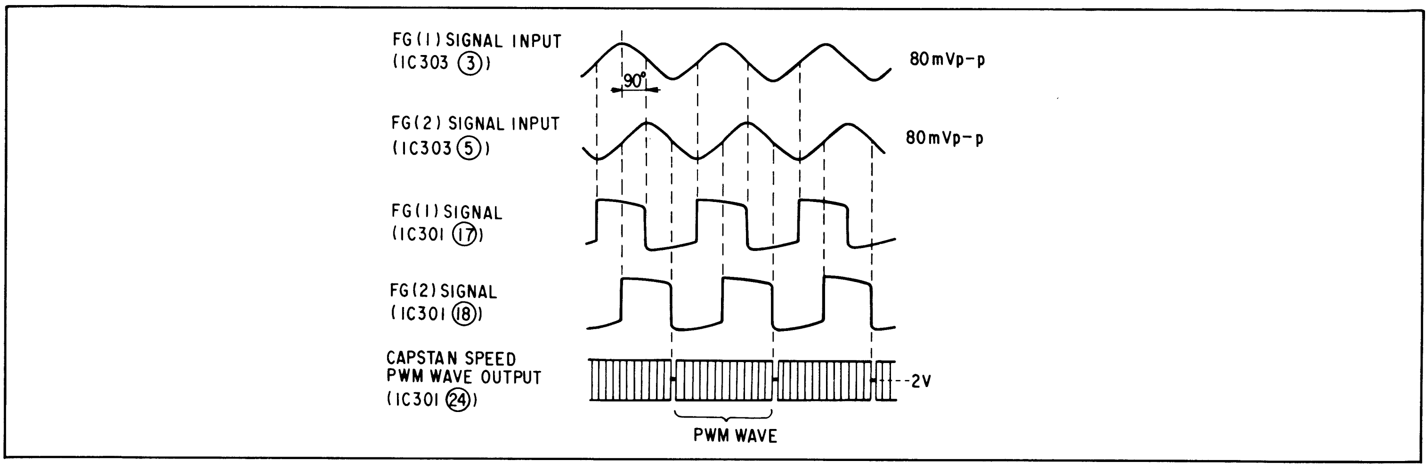


Fig. 3-11 Capstan Speed System Timing Chart

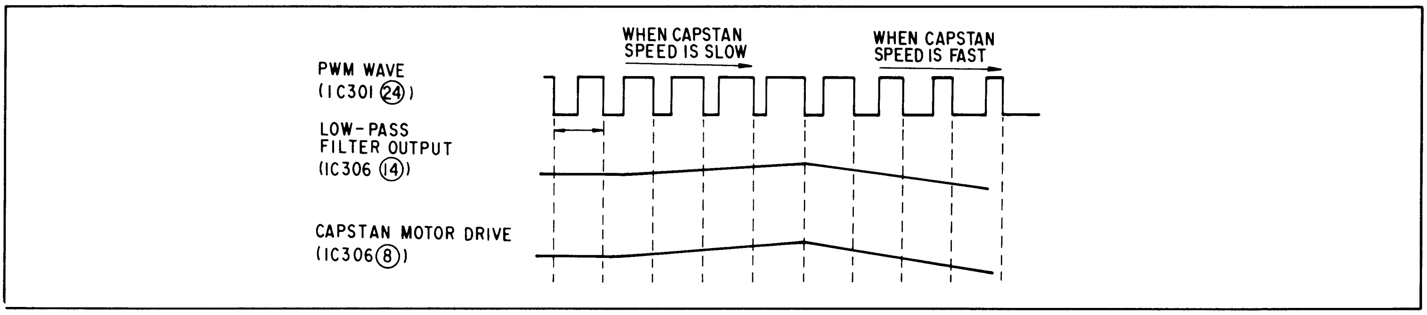


Fig. 3-12 Relationship Between PWM Wave and Capstan Speed Error Voltage

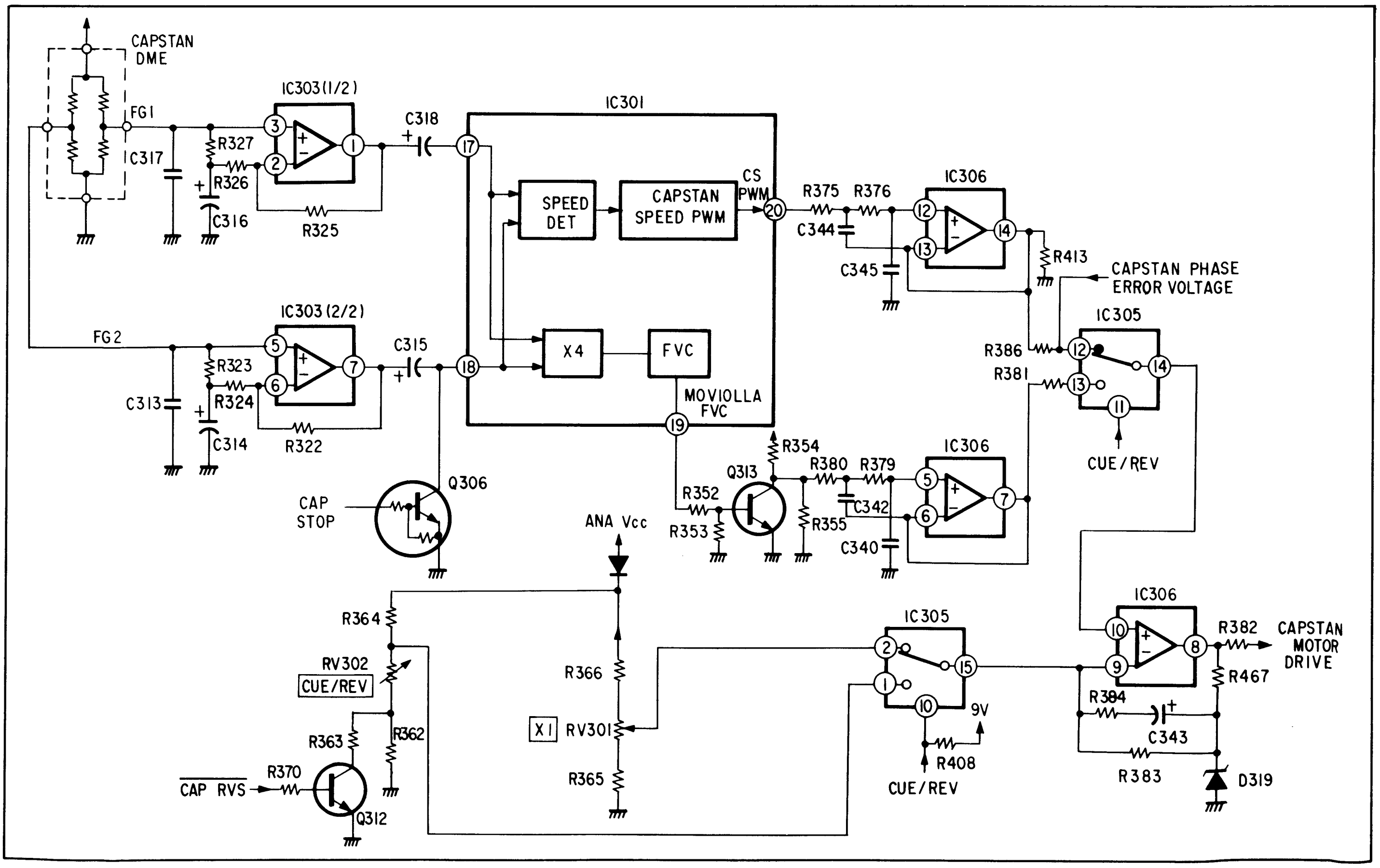

CAPSTAN
DME
FG1
C317
IC303(1/2)
R327
R326
C316
R325
C318
IC301
SPEED
DET
CAPSTAN
SPEED PWM
CS
PWM
X4
FVC
MOVIOLLA
FVC
FG2
C313
IC303(2/2)
R323
R324
C314
R322
C315
Q306
CAP
STOP
R375
R376
C344
C345
IC306
R413
CAPSTAN PHASE
ERROR VOLTAGE
IC305
R386
R381
CUE/REV
R354
Q313
R380
R379
C342
R352
R353
R355
C340
IC306
ANA Vcc
R364
RV302
CUE/REV
R363
R362
R370
CAP RVS
Q312
R366
X1
RV301
R365
IC305
9V
R408
CUE/REV
IC306
R382
CAPSTAN
MOTOR
DRIVE
R467
R384
C343
R383
D319

Fig. 3-13

3-2-2. Capstan Phase System

The tape speed may deviate due to temperature and aging variations if only a speed servomechanism is used during recording or replay. The tape speed is accurately controlled by phase comparing the vertical SYNC signal of video input signals and capstan FG signal using the speed servo system during recording.

During replay, the error voltage obtained by phase comparing the reference signal contained and CTL signal is applied to the capstan motor to control the tape feed phase so that the video head traces the correct track.

Mode	Reference Signal	Comparision Signal
Playback	INT VD delay signal	CTL signal
Recording	Vertical SYNC signal	FG signal

Playback mode

The phases of the PB CTL signal to be input to pin ⑯ of IC307 as the tape position signal and INT VD counted down from reference 4.43MHz are compared, and the result is output from pin ⑳ of IC301 as a capstan phase PWM wave.

INT VD as a reference signal is delayed by the tracking control delay circuit, and tracking is controlled by varying the delay amount by the tracking volume knob. The capstan phase PWM wave from pin ⑳ is fed to the active low-pass filter (pins ①, ②, and ③ of IC306), is converted to a DC voltage, and is output from pin ① of IC306. This capstan phase voltage is fed to the phase compensation circuit where it is mixed with the capstan speed voltage, is input to pin ⑩ of IC306, and is output from pin ⑧ of IC306 to as a capstan motor drive signal.

CUE/REV mode

The pin ⑬ side of IC305 switches ON to disengage the normal servomechanism to switch to the CUE/REV speed servo-mechanism. D308, R372, and D319 quicken pulling of the capstan phase system when returning from CUE/REV to PB.

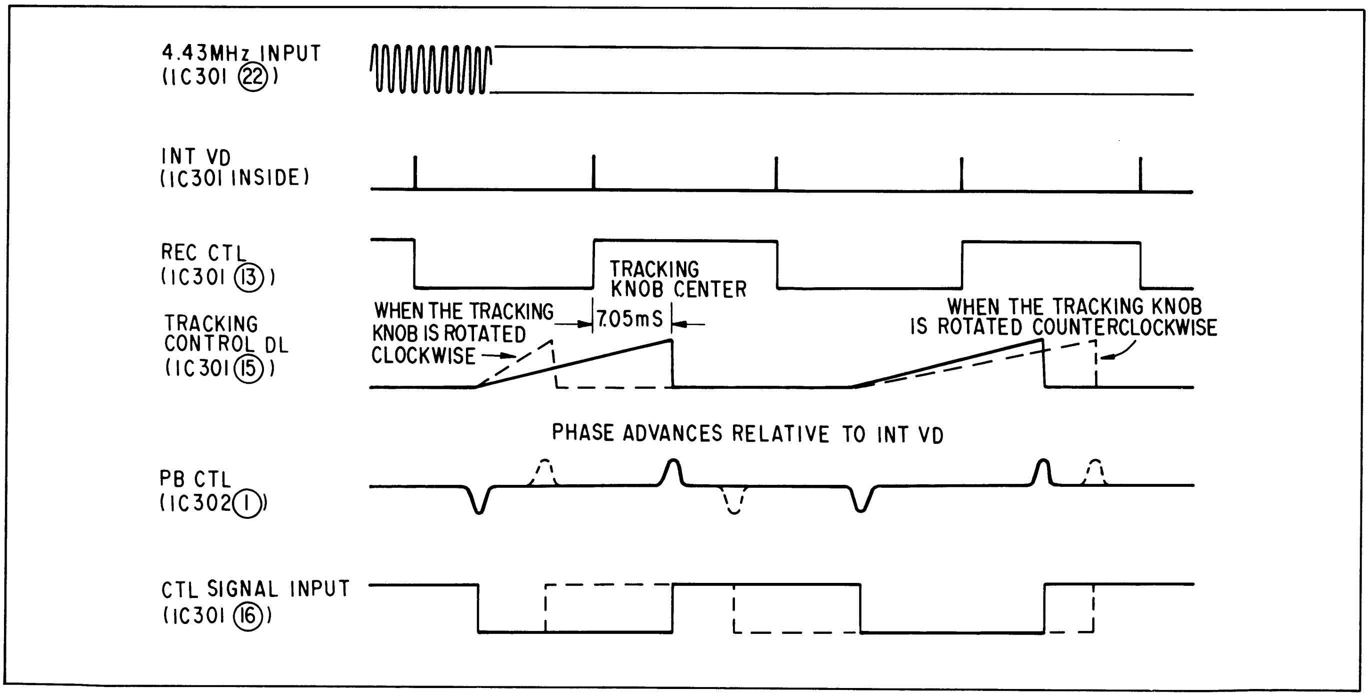

4.43MHz INPUT (IC301 ㉒)
INT VD (IC301 INSIDE)
REC CTL (IC301 ⑬)
TRACKING KNOB CENTER
TRACKING CONTROL DL (IC301 ⑮)
WHEN THE TRACKING KNOB IS ROTATED CLOCKWISE
7.05mS
WHEN THE TRACKING KNOB IS ROTATED COUNTERCLOCKWISE
PHASE ADVANCES RELATIVE TO INT VD
PB CTL (IC302①)
CTL SIGNAL INPUT (IC301 ⑯)

Fig. 3-14 Capstan Phase System Timing Chart (PB)

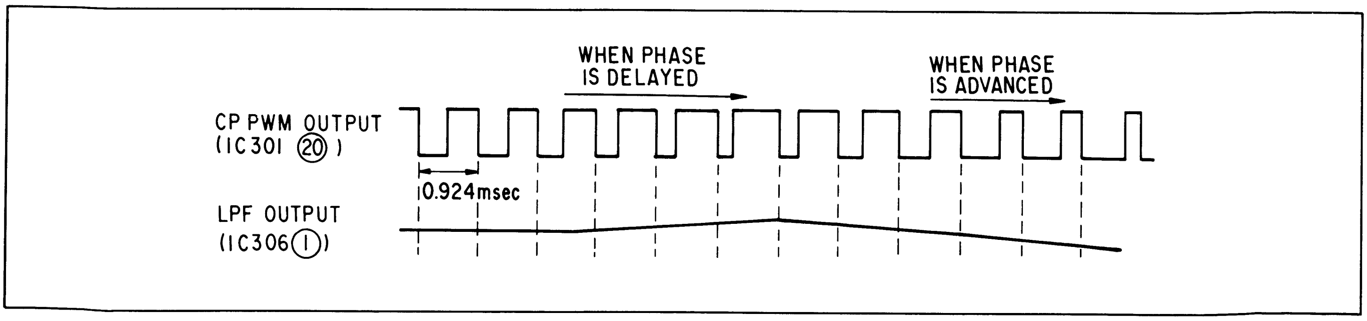

WHEN PHASE IS DELAYED
WHEN PHASE IS ADVANCED
CP PWM OUTPUT (IC301 ⑳)
0.924msec
LPF OUTPUT (IC306①)

Fig. 3-15 Relationship Between CP PWM Waveform and Phase Error Voltage

REC Mode

During recording, Q304 switches OFF, COMP SYNC is input to pin ③ of IC301 to separate the vertical SYNC signal inside IC301. INT VD is reset by the vertical SYNC signal to apply external synchronization. This becomes the reference signal of the phase detection circuit inside IC301. The FG signal from the capstan is counted down inside IC301 and is input to the phase detection circuit in which the phase is compared. The result is output from pin ⑳ as the capstan phase PWM signal.
INT VD is output from pin ⑬ as a REC CTL signal and is recorded on the tape.

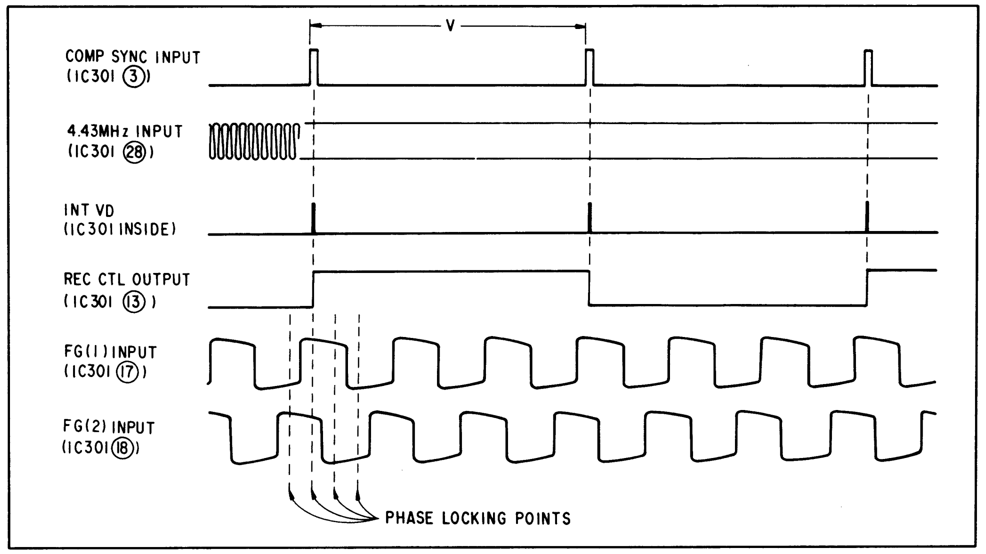


Fig. 3-16 Capstan Phase System Timing Chart (REC)

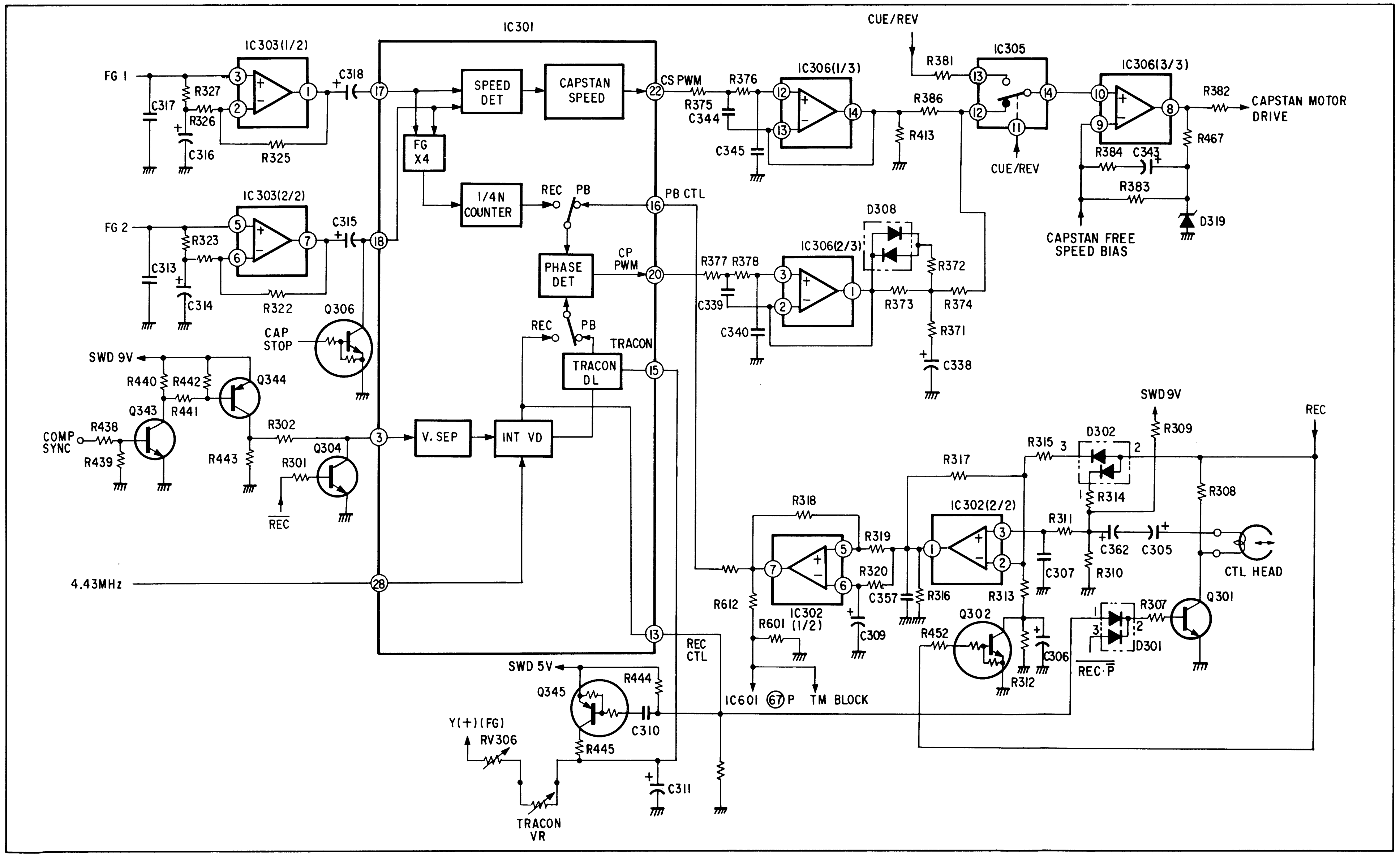

IC301
IC303(1/2)
IC303(2/2)
FG 1
FG 2
C317
R327
R326
C316
R325
C318
C313
R323
C314
R322
C315
SPEED DET
CAPSTAN SPEED
FG X4
1/4N COUNTER
REC
PB
PHASE DET
CP PWM
TRACON DL
TRACON
V. SEP
INT VD
CS PWM
PB CTL
Q306
CAP STOP
SWD 9V
R440
R442
Q344
Q343
R441
COMP SYNC
R438
R439
R302
R443
Q304
R301
REC
4.43MHz
SWD 5V
Q345
R444
C310
R445
C311
Y(+)(FG)
RV306
TRACON VR
REC CTL
CUE/REV
R376
R375
C344
C345
IC306(1/3)
R381
IC305
R386
R413
IC306(3/3)
R382
CAPSTAN MOTOR DRIVE
R467
R384
C343
R383
D319
CAPSTAN FREE SPEED BIAS
D308
IC306(2/3)
R377
R378
C339
C340
R372
R373
R374
R371
C338
SWD9V
R309
REC
D302
R315
R317
R314
R308
R318
IC302(2/2)
R311
R319
R320
C357
R316
R313
C307
C362
C305
R310
CTL HEAD
Q301
R307
D301
R612
IC302 (1/2)
R601
C309
Q302
R452
C306
R312
REC·P
IC601 ⑥⑦P
TM BLOCK

Fig. 3-17.

3-3. REEL MOTOR CONTROL CIRCUIT

This circuit controls reel table rotation matching the following six major modes.

1. STOP and PAUSE mode
2. PB and REC mode
3. TAPE UNLOAD mode
4. F/R search mode
5. CUE/REV mode
6. FF/REW mode

1. STOP and PAUSE mode

The level of the REEL STOP signal changes to "H" and Q338 switches ON during the STOP or PAUSE mode. The reel motor drive signal is muted, and the reel motor stops. If D316 is not mounted, approximately 9V is applied to the Q318 base side, and the emitter voltage reaches approximately 8V. An inverse withstanding voltage is applied between the base and emitter of Q317. D316 reduces the Q318 base voltage to less than 0.6V only during stopping to prevent an inverse withstanding voltage to be applied.

2. PB and REC mode

The level of PB + REC-1 becomes "H" during the PB or REC mode, and Q618 switches ON. The voltage divided by R391 and a combined resistor of R419, R392, and RV308 is applied to the base of Q318. The output of it is current amplified by Q316 and Q315 and becomes a reel motor drive signal to rotate the reel motor. When the pinch plunger clinches, the F/R search mode is set up for only 10msec to increase the reel motor voltage and not to sag the tape.

3. TAPE UNLOAD mode

The level of the $\overline{\text{UNLOAD}}$ signal becomes "L", and Q337 switches OFF. By this, the current flowing to R389 and R389 voltage drops increase, and a current flows through R426, Q314, R427, and R428. Q338 switches ON to suppress the reel motor voltage. The motor torque is limited by restricting the motor current in order to prevent tape damage.

4. F/R search mode

In the F/R search mode, Q618 switches OFF, Q619 switches ON, and the reel motor is driven by a voltage divided by R391 and a combined resistor of R419, R392, RV308, and R394.

5. Picture search mode

(For CUE)

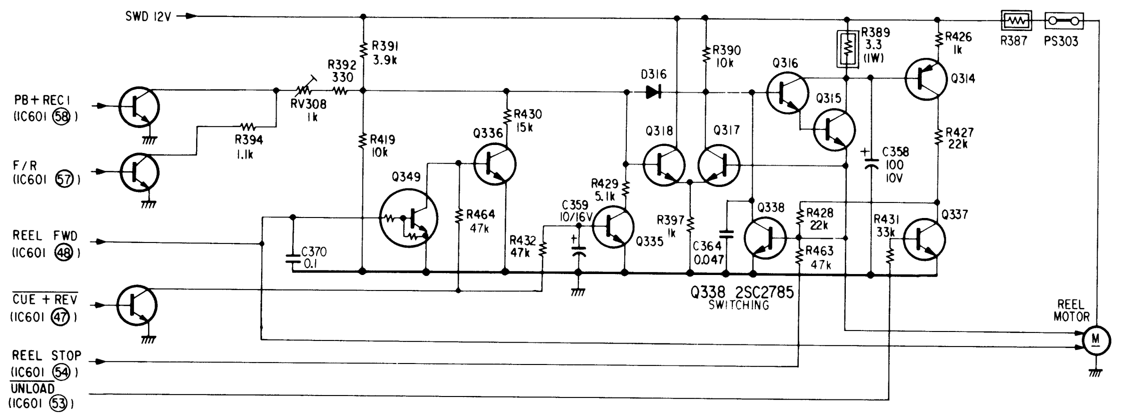
The level of the CUE/REV signal becomes "H", Q336 and Q335 turn ON, and the reel motor is driven by the voltage divided by R391 and a combined resistor of R419, R430, and R429.

(For REV)

The level of the CUE/REV and $\overline{\text{REEL FWD}}$ signals both become "H", while Q336 is switched OFF. Q335 only is in an ON state. The reel motor is driven by the voltage divided by R391 and a combined resistor of R419 and R429.

6. FF/REW mode

The voltage divided by R391 and R419 is applied to the Q318 base to drive the reel motor.


SWD 12V
PB+REC1 (IC601 ㊽)
F/R (IC601 ㊼)
REEL FWD (IC601 ㊽)
CUE + REV (IC601 ㊼)
REEL STOP (IC601 ㊿)
UNLOAD (IC601 ㊿)
R391 3.9k
R392 330
RV308 1k
R394 1.1k
R419 10k
R430 15k
Q336
Q349
C370 0.1
R464 47k
R432 47k
C359 10/16V
R429 5.1k
Q335
D316
Q318
Q317
R390 10k
R397 1k
C364 0.047
Q338
Q338 2SC2785 SWITCHING
R428 22k
R463 47k
Q316
Q315
R389 3.3 (1W)
C358 100 10V
R431 33k
Q337
R426 1k
Q314
R427 22k
R387
PS303
REEL MOTOR
M

		FF	REW	REV	CUE	FWD SERCH	RVS SERCH	T UNLOAD	PB REC	STOP	PB·PAUSE REC·PAUSE
PB +REC·1	(58)	L	L	L	L	L	L	L	H	L	H
F/R	(57)	L	L	L	L	H	H	L	L	L	L
$\overline{\text{REEL FWD}}$	(48)	L	H	H	L	L	H	H	L	L	L
C/R		L	L	H	H	L	L	L	L	L	L
REEL STOP	(54)	L	L	L	L	L	L	L	L	H	H
$\overline{\text{UNLOAD}}$	(53)	H	H	H	H	H	H	L	H	H	H

Fig. 3-18 Reel Motor Control Circuit

4. POWER SUPPLY CIRCUIT

4-1. SWD 12V AND SWD 9V SYSTEM

The secondary side output of the power supply transformer, 15V AC, is rectified by D001 on the PS-45 Board. The rectifieid voltage is input to pin ④ of IC001 packaged on the PS-69 Board.

Pins ① and ② of IC001 have 12 and 9V outputs, respectively. Pin ③ is a control pin for outputs of pins ① and ②.

Outputs can be obtained at pins ① and ② when the level of this control pin is high or is floating. Outputs cannot be obtained when the level of this pin is low. It is actually operated by an inverter (Q102) after obtaining a control signal from the timer circuit through pin ⑤ ($\overline{\text{PWR ON}}$) of CN104 by ON/OFF switching of the ON/STANDBY switch.

4-2. UNSWD 12V SYSTEM

The voltage rectified by D001 on the PS-45 Board is input to the collector of Q101 on the PS-46 Board.

The base bias of Q101 is provided through R101. Q104 on the PS-46 Board is for constant-voltage control of UNSWD 12V, and the emitter of Q104 is connected to the cathode of the constant voltage diode D103, and this voltage is used as a reference voltage. The output voltage of Q101 is fed to the base of Q104 after being divided by R104 and R103. Q104 compares the reference and output voltages and fetches the differential current from the collector of Q104 to control Q101.

4-3. UNSWD 6V AND UNSWD 5V SYSTEMS

The rectified current output of D001 on the PS-45 Board is input to the collector of Q101 on the PS-46 Board through R107. R107 (39Ω 2W) is connected to reduce Pc (collector loss) of Q101. The cathode of the constant voltage diode D103 is connected to the base of Q101, at which the voltage remains constant at approximately 6.6V. Therefore, output of 6V is obtained at the emitter of Q101 to be the UNSWD 6V system voltage. The anode of D105 is connected to this 6V, and the output voltage on the cathode side is used as the UNSWD 5V system.

The Q101 base bias resistor R101 and Q103 base bias resistor R103 are connected to the UNSWD 45V system power supply. By this, a sufficient bias current flows to the bases of Q101 and Q103 to stabilize the output voltages at these voltages even when the AC voltage is lowered.

4-4. UNSWD +45V, UNSWD –45V, AND UNSWD –30V SYSTEMS

35V AC is rectified by D101 and D102 to obtain UNSWD +45V and UNSWD –45V system voltages. The UNSWD –30V system voltage is obtained by lowering the UNSWD –45V system voltage through R106.

4-5. 4.8V AC SYSTEM

The secondary side output of the power transformer is used as it is.

4-6. UNSWD12V, SWD12V, AND SWD9V SYSTEMS POWER SUPPLY (SL-F30E(E), SL-F60E(E), SL-T25ME)

A combination of a switching regulator (chopper regulator) and a voltage selector are used in the power supply section of an E model in the SL-F30E and SL-T25ME in order to respond easily and effectively to the different voltages of each country. The voltage selector, with the help of a two-stage device, can change the winding ratio of a transformer for 110V–127V input to the one for 220V–240V. Therefore, secondary voltages are different according to the voltage of a power supply. For example, in the case of 220V and 240V power inputs, the latter will have some 10% higher secondary voltage. Switching regulators are used instead of series ones to reduce the power supply efficiency difference caused by an input power supply voltage difference (viz. the differences in caloric value of the regulator).

IC001 on the PS-76 board consists of a switching regulator for D.C. 12V output and a series regulator for D.C. 9V output. Secondary A.C. 25V of the power supply transformer will be rectified by D001 on the PS-67 board (as mentioned before, this voltage can be different depending upon the power supply voltage) and be fed to pin ⑬. The direct current voltage fed to pin ⑬ will be switched by a transistor within the IC and will be converted to about 54kHz pulse at pin ⑫. This pulse will be smoothed by L002 and C012 and will convert to a D.C. voltage again. It will be fed back inside the IC through pin ⑤ of the IC001 and will convert the duty ratio of the switching pulse. By this feedback loop, a direct current will be stabilized at 12V. This stabilized D.C. 12V voltage, through LPF of the L003 and C013, will become a power supply for a UNSWD12V system. At the same time, passing a LPF of the L004 and C014, and through the power supply switch Q006 on the PS-67 board, it will also become a SWD12V system power supply for a servo-system control system. And the UNSWD12V system power supply will also be fed to the series regulator inside the IC001 pin③, will be stabilized at 9V, and will be output from pin ②. The 9V power supply turns on when the control signal being fed to pin ④ is "H". Thus, the pin ② output will become a power supply for a SWD9V system. Furthermore, the UNSWD12V system power supply, through the power switch Q005 on the PS-67 board will become a SWD 12V system power supply, a video, tuner and audio system. Also, IC001 has an overcurrent detective circuit inside. The negative side of the PS-67 board is connected with IC001 pin ⑦. The GND of a VTR is connected with IC001 pin ⑩. Thus, all the IC001 output current will flow through the resistance existing between the IC001 pin ⑩ and pin ⑦ inside the IC. Inside the IC, this voltage produced between both the ends of the resistances will be detected, and when the IC001 output current is above the fixed value (of about 4.7A), switching pulses will be stopped and a switching transistor will be turned off to protect the switching regulators.

4-7. UNSWD6V SYSTEM, 5V SYSTEM

UNSWD12V system power supply output is fed to a 6V series regulator consisting of Q003 and D008 and becomes a UNSWD6V system power supply. The UNSWD6V system power supply becomes a UNSWD5V system power supply through D009.

4-8. UNSWD39V SYSTEM, UNSWD–39V SYSTEM

The secondary A.C. 35V output from the power supply transformer will be rectified by D002 and become a UNSWD39V system power supply through a regulator composed of Q001 and D003. Also the A.C. 35V output will be rectified by D004, and become a UNSWD–39V system power supply through the regulator consisting of Q002 and D005.

4-9. AC4.8V SYSTEM

The secondary output from the power supply transformer is directly used.

4-10. SL-F30UB PROTECTIVE CIRCUIT

In the SL-F30UB power supply circuit, protective circuits of the PS-46 board, Q105–Q106 and PS-45 board F003 are added to meet the British Safety Standards.

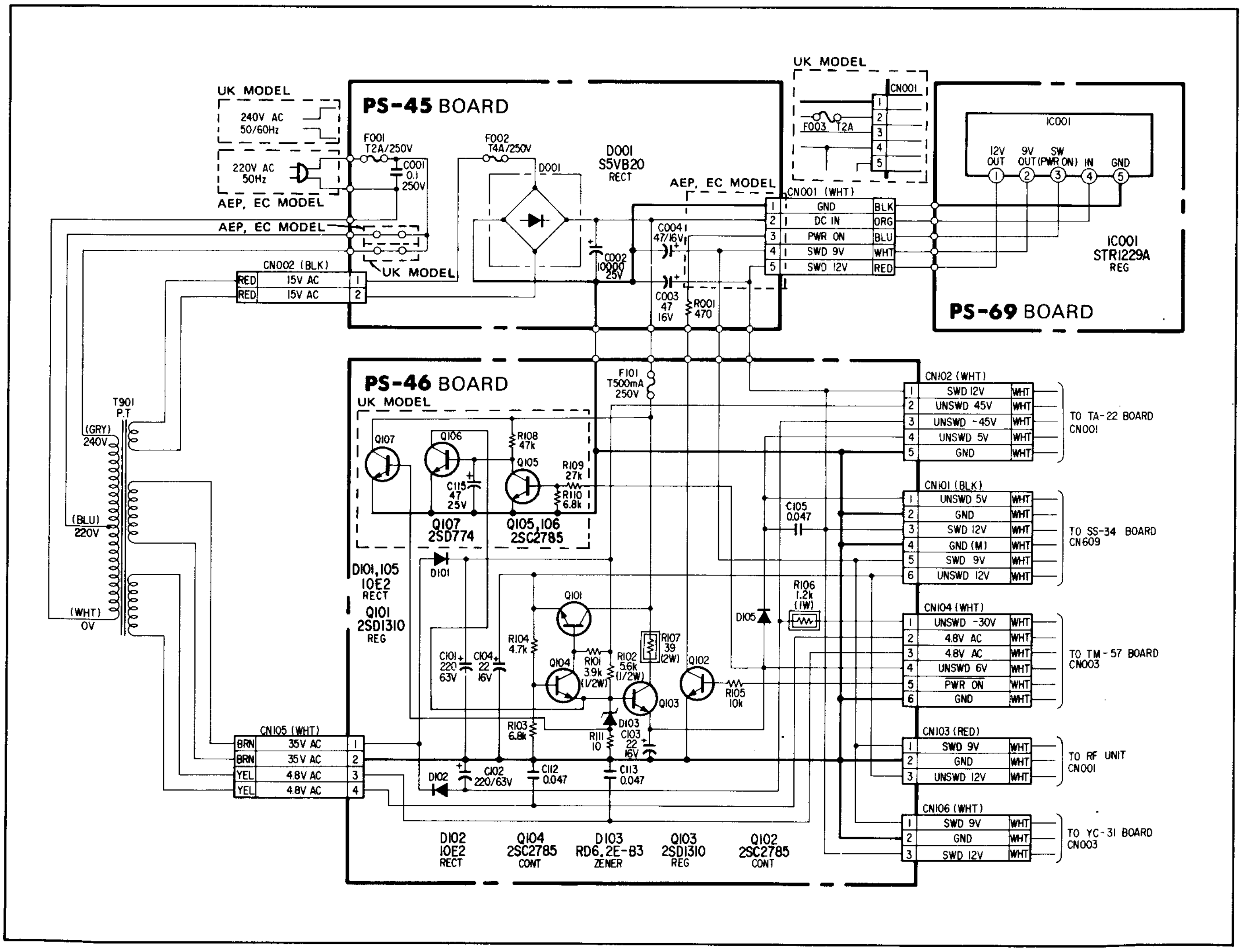

UK MODEL
240V AC
50/60Hz
220V AC
50Hz
AEP, EC MODEL
AEP, EC MODEL
UK MODEL
PS-45 BOARD
F001
T2A/250V
C001
0.1
250V
F002
T4A/250V
D001
D001
S5VB20
RECT
AEP, EC MODEL
C004
47/16V
C002
10000
25V
C003
47
16V
R001
470
CN002 (BLK)
RED 15V AC 1
RED 15V AC 2
UK MODEL
CN001
F003 T2A
CN001 (WHT)
1 GND BLK
2 DC IN ORG
3 PWR ON BLU
4 SWD 9V WHT
5 SWD 12V RED
IC001
12V OUT
9V OUT
SW (PWR ON)
IN
GND
IC001
STR1229A
REG
PS-69 BOARD
T901
P.T
(GRY)
240V
(BLU)
220V
(WHT)
0V
PS-46 BOARD
UK MODEL
Q107
Q106
R108
47k
Q105
R109
27k
C115
47
25V
R110
6.8k
Q107
2SD774
Q105,106
2SC2785
F101
T500mA
250V
D101,105
10E2
RECT
Q101
2SD1310
REG
D101
Q101
R104
4.7k
C101
220
63V
C104
22
16V
Q104
R101
3.9k
(1/2W)
R102
5.6k
(1/2W)
R107
39
(2W)
Q102
Q103
R105
10k
D105
R106
1.2k
(1W)
C105
0.047
R103
6.8k
R111
10
D103
C103
22
16V
D102
C102
220/63V
C112
0.047
C113
0.047
CN105 (WHT)
BRN 35V AC 1
BRN 35V AC 2
YEL 4.8V AC 3
YEL 4.8V AC 4
D102
10E2
RECT
Q104
2SC2785
CONT
D103
RD6.2E-B3
ZENER
Q103
2SD1310
REG
Q102
2SC2785
CONT
CN102 (WHT)
1 SWD 12V WHT
2 UNSWD 45V WHT
3 UNSWD -45V WHT
4 UNSWD 5V WHT
5 GND WHT
TO TA-22 BOARD
CN001
CN101 (BLK)
1 UNSWD 5V WHT
2 GND WHT
3 SWD 12V WHT
4 GND (M) WHT
5 SWD 9V WHT
6 UNSWD 12V WHT
TO SS-34 BOARD
CN609
CN104 (WHT)
1 UNSWD -30V WHT
2 4.8V AC WHT
3 4.8V AC WHT
4 UNSWD 6V WHT
5 PWR ON WHT
6 GND WHT
TO TM-57 BOARD
CN003
CN103 (RED)
1 SWD 9V WHT
2 GND WHT
3 UNSWD 12V WHT
TO RF UNIT
CN001
CN106 (WHT)
1 SWD 9V WHT
2 GND WHT
3 SWD 12V WHT
TO YC-31 BOARD
CN003

Fig. 4-1

5. AUDIO CIRCUIT

5-1. E-E SYSTEM

The signal input to the AUDIO LINE INPUT terminal is input to the TA-22 Board from pin ④ of CN301. After passing through the attenuator, which consists of R305 and R306, and C304, the signal is input to pin ⑦ of IC301. A TUNER signal is selected when the level of pin ③ of IC301 is high, while a LINE signal is selected when the level is low, for output from pin ④.

The output of pin ④ of IC302 is input to pin ⑱, which is an input pin of IC303, after passing through C307. The signal passes through the SWITCH circuit (the E-E side (Pin ⑱ is selected when the level of pin ⑰ (PB + AUDIO DUB) is low, while the PB side (pin ①) is selected when the level is high) and is amplified by the LINE AMPLIFIER (approximately 40dB). The signal is then output to pin ⑪ and is fed to the LINE OUT terminal and RF modulator after passing through R310 and being connected to pin ① (AUDIO OUT) of CN301.

5-2. RECORDING SYSTEM

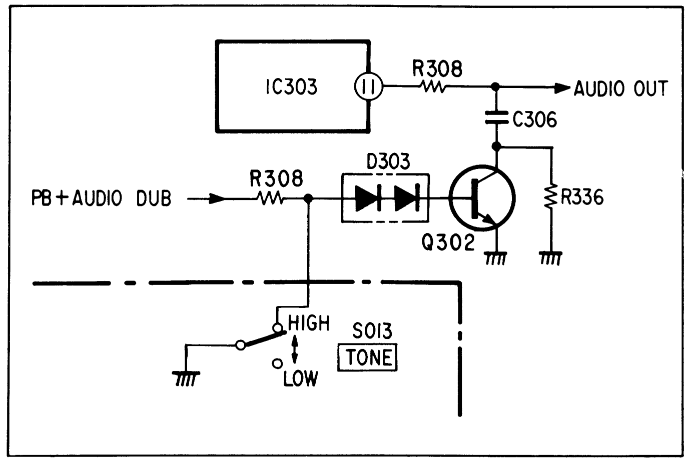
The flow of the E-E signal is the same as that of the E-E system. The level of pin ① ($\overline{\text{BIAS CONT}}$) of CN302 becomes L during recording. Q331 then switches ON and the bias oscillation circuit consisting of T331 and Q332 operates. The level of pin ⑨ of IC303 turns, and the recording amplifier inside IC303 operates. The level of pin ⑤ of IC302 becomes high and Q303 switches ON, to change the level of pin ⑦ of IC302 to low. By this, pin ③ of IC302 is connected to the GND side (pin ④ side) to set up pin ① in an OPEN state. As a result, the voice signal and recording bias signal are fed to the audio head.

5-3. PLAYBACK SYSTEM

The level of pin ② (PB + AUDIO DUB) of CN302 changes to high during replaying. By this, the level of pin ⑰ of IC303 becomes high, and the internal switch of IC303 switches to the pin ① side. The level of the $\overline{\text{BIAS CONT}}$ is high, and Q331 is switched OFF, while Q303 is switched ON. By this, the level of pin ⑤ of IC302 changes to low, and that of pin ⑦, to high. Therefore, pin ① is connected to GND and pin ③ opens.

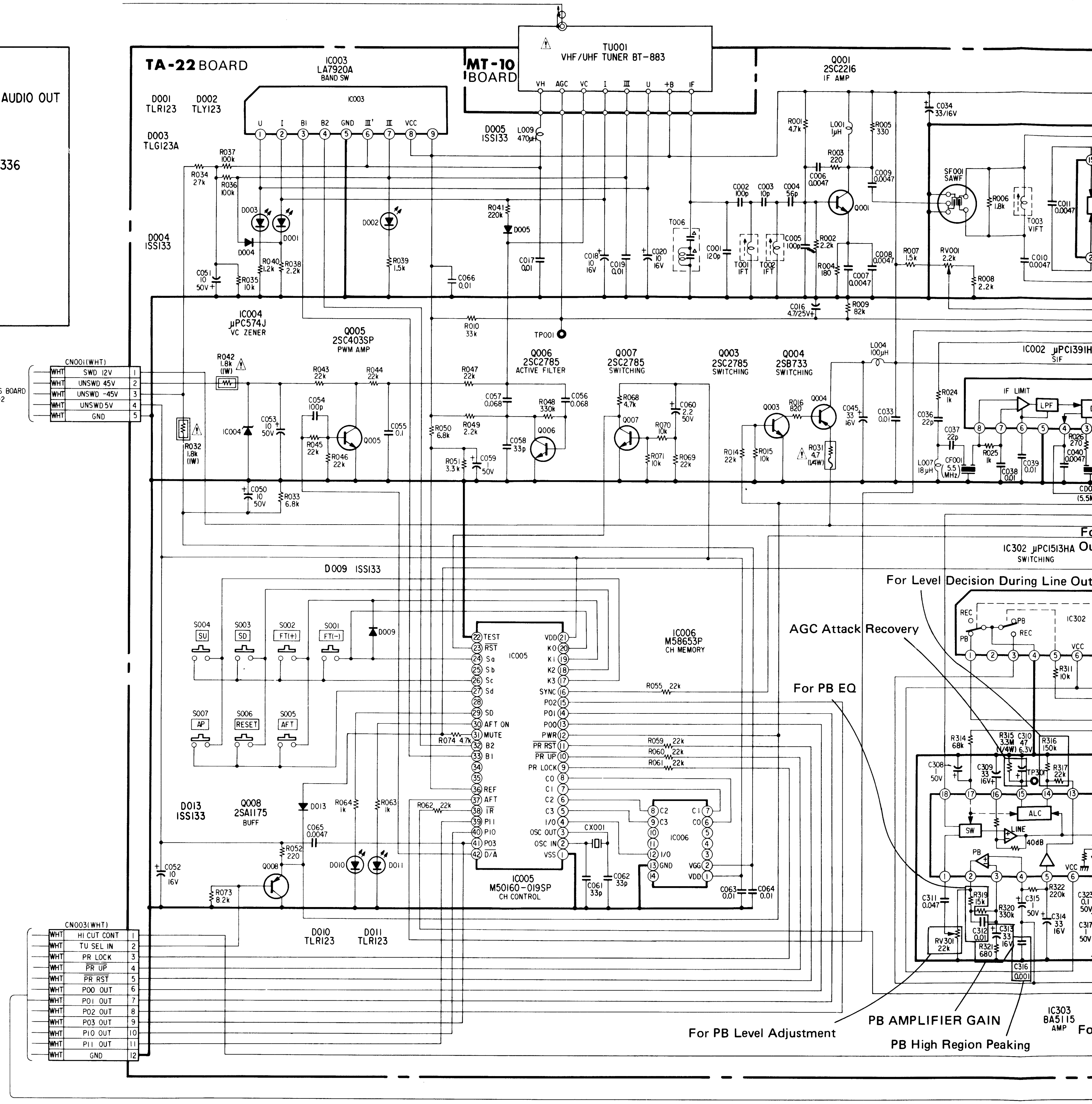
As a result, the voice signals played back by the audio head are input to pin ④ of IC303. The signals are amplified by the playback equalizer amplifier and are output to pin ②. The signals are fed to Semi-Fixed Resistor RV301 and pin ① and are output from pin ⑪ after being amplified by the line amplifiers.

Q302 is for high cutting during replaying. As shown in Fig. 5-1, the high-cut circuit operates only during replaying.



IC303
⑪
R308
AUDIO OUT
C306
PB+AUDIO DUB
R308
D303
R336
Q302
HIGH
S013
TONE
LOW

Fig. 5-1



TA-22 BOARD
MT-10 BOARD
TU001 VHF/UHF TUNER BT-883
IC003 LA7920A BAND SW
Q001 2SC2216 IF AMP
IC004 μPC574J VC ZENER
Q005 2SC403SP PWM AMP
Q006 2SC2785 ACTIVE FILTER
Q007 2SC2785 SWITCHING
Q003 2SC2785 SWITCHING
Q004 2SB733 SWITCHING
IC002 μPC1391H SIF
IC005 M50160-019SP CH CONTROL
IC006 M58653P CH MEMORY
Q008 2SA1175 BUFF
IC302 μPC1513HA SWITCHING
IC303 BA5115 AMP
CN001(WHT)
TO PS-46 BOARD CN102
CN003(WHT)
S004 SU
S003 SD
S002 FT(+)
S001 FT(−)
S007 AP
S006 RESET
S005 AFT
For Level Decision During Line Out
AGC Attack Recovery
For PB EQ
For PB Level Adjustment
PB AMPLIFIER GAIN
PB High Region Peaking

Fig. 5-2

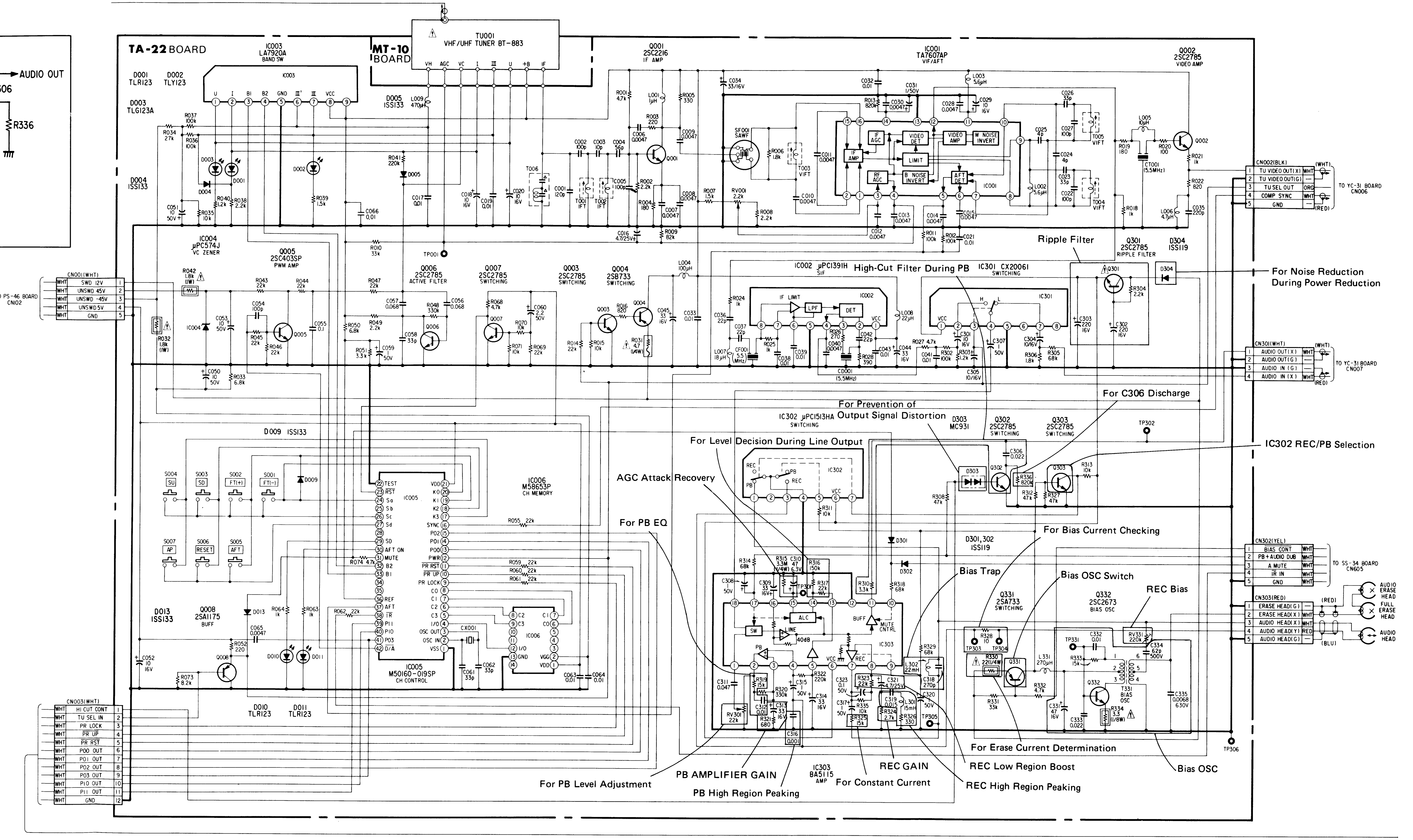

TA-22 BOARD
MT-10 BOARD
TU001 VHF/UHF TUNER BT-883
IC003 LA7920A BAND SW
IC001 TA7607AP VIF/AFT
Q001 2SC2216 IF AMP
Q002 2SC2785 VIDEO AMP
IC004 μPC574J VC ZENER
Q005 2SC403SP PWM AMP
Q006 2SC2785 ACTIVE FILTER
Q007 2SC2785 SWITCHING
Q003 2SC2785 SWITCHING
Q004 2SB733 SWITCHING
IC002 μPC1391H SIF
IC301 CX20061 SWITCHING
Q301 2SC2785 RIPPLE FILTER
D304 ISS119
IC006 M58653P CH MEMORY
IC005 M50160-019SP CH CONTROL
Q008 2SA1175 BUFF
IC302 μPC1513HA SWITCHING
D303 MC931
Q302 2SC2785 SWITCHING
Q303 2SC2785 SWITCHING
D301,302 ISS119
Q331 2SA733 SWITCHING
Q332 2SC2673 BIAS OSC
IC303 BA5115 AMP
→AUDIO OUT
R336
TO PS-46 BOARD CN102
CN001(WHT)
SWD 12V
UNSWD 45V
UNSWD -45V
UNSWD 5V
GND
CN003(WHT)
HI CUT CONT
TU SEL IN
PR LOCK
PR UP
PR RST
P00 OUT
P01 OUT
P02 OUT
P03 OUT
P10 OUT
P11 OUT
GND
CN002(BLK)
TU VIDEO OUT(X)
TU VIDEO OUT(G)
TU SEL OUT
COMP SYNC
GND
TO YC-31 BOARD CN006
CN301(WHT)
AUDIO OUT(X)
AUDIO OUT(G)
AUDIO IN(G)
AUDIO IN(X)
TO YC-31 BOARD CN007
CN302(YEL)
BIAS CONT
PB+AUDIO DUB
A MUTE
IR IN
GND
TO SS-34 BOARD CN605
CN303(RED)
ERASE HEAD(G)
ERASE HEAD(X)
AUDIO HEAD(X)
AUDIO HEAD(Y)
AUDIO HEAD(G)
AUDIO ERASE HEAD
FULL ERASE HEAD
AUDIO HEAD
S004 SU
S003 SD
S002 FT(+)
S001 FT(-)
S007 AP
S006 RESET
S005 AFT
D009 ISS133
D013 ISS133
D010 TLR123
D011 TLR123
D001 TLR123
D002 TLY123
D003 TLG123A
D004 ISS133
D005 ISS133
TP001
TP302
TP306
Ripple Filter
High-Cut Filter During PB
For Noise Reduction During Power Reduction
For C306 Discharge
For Prevention of Output Signal Distortion
IC302 REC/PB Selection
For Level Decision During Line Output
AGC Attack Recovery
For PB EQ
For Bias Current Checking
Bias Trap
Bias OSC Switch
REC Bias
For Erase Current Determination
Bias OSC
REC Low Region Boost
REC High Region Peaking
REC GAIN
For Constant Current
For PB Level Adjustment
PB AMPLIFIER GAIN
PB High Region Peaking

Fig. 5-2

6. TIMER BLOCK

6-1. GENERAL

The timer block consists of a timer microcomputer, clock oscillation circuit, reset circuit, power failure detection circuit, and fluorescent vacuum display tube.

6-2. CLOCK OSCILLATION CIRCUIT

The timer microcomputer MB88525B requires two clock signals, a system clock and timer clock signals. The system clock oscillation circuit is of a CR-type oscillation circuit to set a frequency by R047, RV001, and C006. The oscillation frequency is set to 2.6MHz by RV001. The CR oscillation type is selected to minimize current consumption during standing by (during power failure backing up). Current consumption of the CR oscillation type is a fraction of that of the ceramic oscillation type. When a back-up capacitor of the same capacity is used, the backing-up duration during a power failure is longer with the CR oscillation type. (The backing up time is several seconds with the SL-F30 series and more than three minutes with the SL-F60 series.)

The timer clock oscillation circuit is of a quartz oscillation type, and the oscillation frequency is set by TC001, C005, and X001. The frequency is set to 32.768MHz by TC001.

6-3. RESET CIRCUIT

The reset circuit has the following two functions. One is to initialize the timer microcomputer (IC001) when the power plug is plugged to the plug socket for the first time or when resetting a voltage after a long power failure during which time backing up is not possible. The other is to forcibly stop the timer microcomputer operation to prevent malfunction when the back-up power voltage is reduced. The reset circuit detects the power voltage (pin (64) of IC001) of the timer microcomputer (IC001). The levlel of the reset pin (pin ㉗ of IC001) is changed to "L" to reset the timer microcomputer when the power voltage is lower than the preset level.

Fig. 6-1 shows the circuit diagram.

A reference voltage utilizing the forward voltage of the light emitting diode D001 is input to the base of Q001. The power voltage is input to the base of Q002 after being divided by R004 and R005. The two voltages are compared by Q001 and Q002, and the output is input to pin ㉗ of IC001 through Q003. R006 provides a hysteresis characteristic to the comparator. Fig. 6-2 shows the power voltage reset output characteristic.

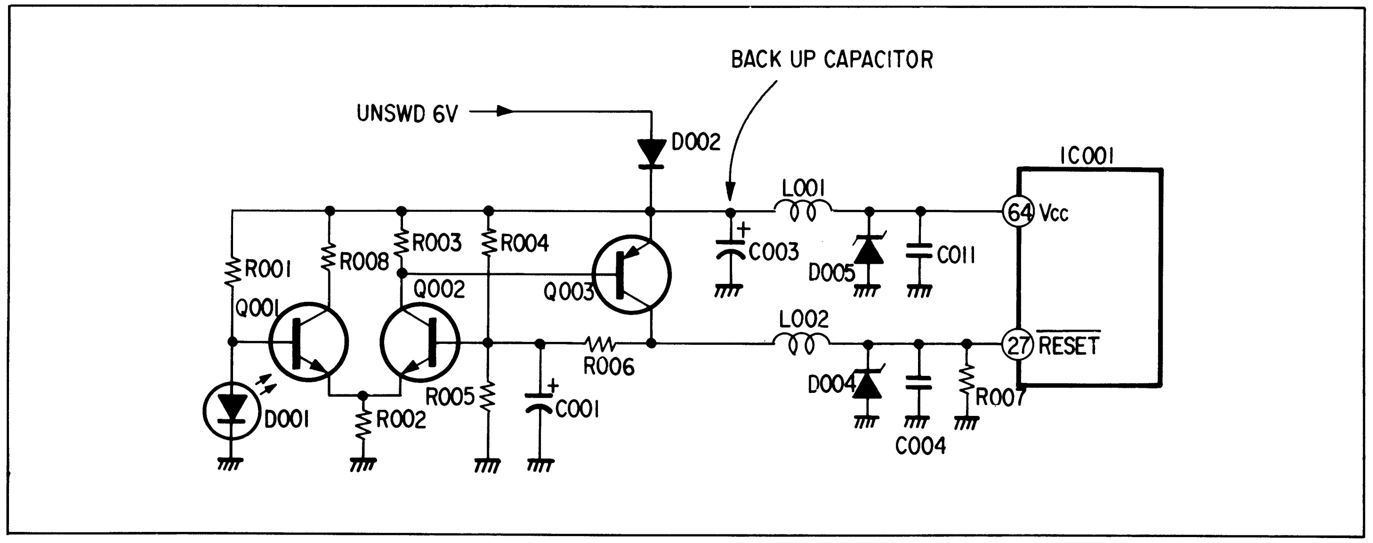


Fig. 6-1

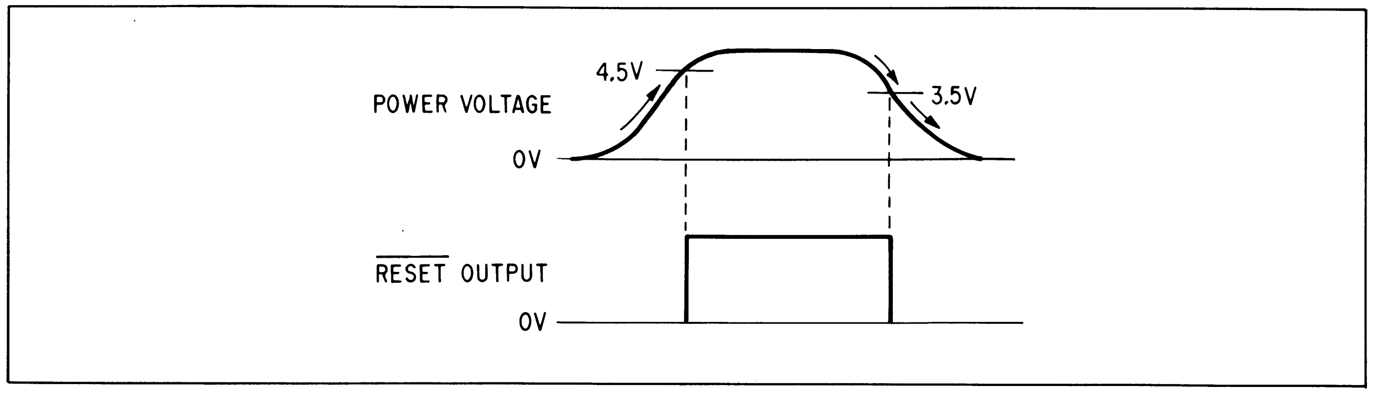


Fig. 6-2

6-4. POWER FAILURE DETECTION CIRCUIT

IC002 is a power failure detection comparator. The level of pin ① (OUT) of IC002 changes to "H" when the voltage of pin ② (VCC) of IC002 is approximately 4.5V or higher. A voltage ("H") obtained by dividing the power voltage fed to D003 by R046 and R045 is input to pin ⑧ (PWR FAIL) of IC001. The level of pin ① (OUT) of IC002 changes to "L" when the voltage at pin ② (VCC) of IC002 is approximately 4.5V or less and over the minimum operating voltage (approx. 1.2V) of IC002.

Pin ① (OUT) of IC002 becomes open when the voltage at pin ② (VCC) of IC002 is below the minimum operating voltage of IC002. The voltage at pin ⑧ of IC001 becomes a voltage dividing the power voltage (being backed up) of IC001 by a pull up resistor (approx. 10kΩ) inside pin ⑧ of IC001 and R045 (2.2kΩ) to hold the "L" level.

The timer microcomputer operation stands by when the voltage at pin ② (VCC) of IC002 becomes less than approximately 4.5V and the level of pin ⑧ (PWR FAIL) of IC001 changes to "L" when a power failure or other phenomenon occurs. The microcomputer is backed up by C003 (470μF . . . SL-F30, 0.047F . . . SL-F60) for several seconds with the SL-F30 series and for more than three minutes with the SL-F60 series. The clock function (no display) and timer recording program protection only are performed in the stand-by status.

Pin ⑬ of IC001 outputs a reset pulse to the system control microcomputer (IC601 on the SS-34 Board) when the power failure recovers, when the voltage at pin ② (VCC) of IC002 becomes more than approximately 4.5V, and when the level of pin ⑧ (PWR FAIL) of IC001 becomes "H".

Q004 and Q005 inputs the output of pin ① (OUT) of IC002 to the reset pin (pin (61) of IC601) of the system control microcomputers to prevent malfunction when the system control microcomputer is reset.

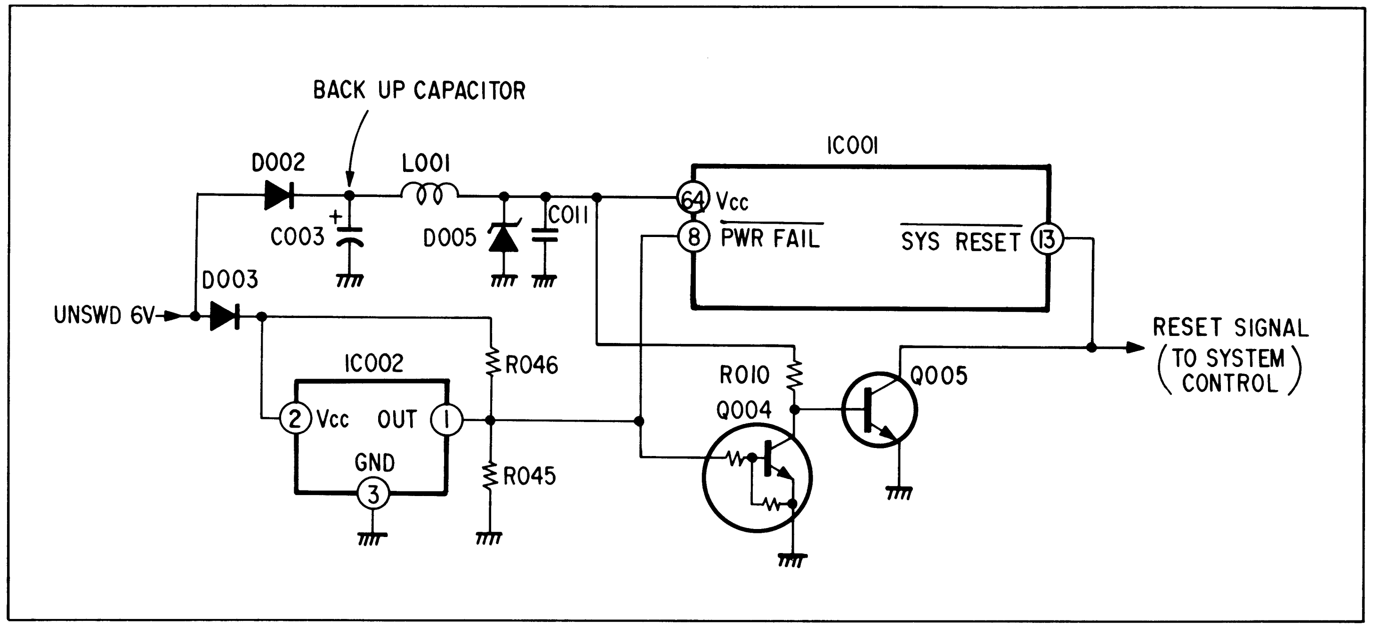


Fig. 6-3

POWER FAILURE DETECTION CIRCUIT
(a set of TM-57 baseboards, part No. 1-613-229-12)

When IC002 pin ② (VCC) of a voltage detective comparator is below about 4.5V, its output terminal pin ① converts from "H" to "L". At this moment, C013 is instantly discharged. Q004 turns off and Q005 turns on. And IC001 pin ⑧ (PWR FAIL) converts to "L". Subsequently, when the power supply voltage recovers and the voltage detective comparator output (IC002 pin ①) converts from "L" to "H", the current flowing in the R046 will charge C013. For this reason, it takes C013 about 20 microseconds to be charged at a necessary level of voltage (about 1.2V) for Q004 to be turned on. No matter how short the charging time may be, whatever short pulse the voltage detective comparator output may be, the microcomputer timer (IC001) can surely detect any power failure because IC001 pin ⑧ (PWR FAIL) is "L" for 20 microseconds.

6-5. OTH

L001, L00
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R024 and
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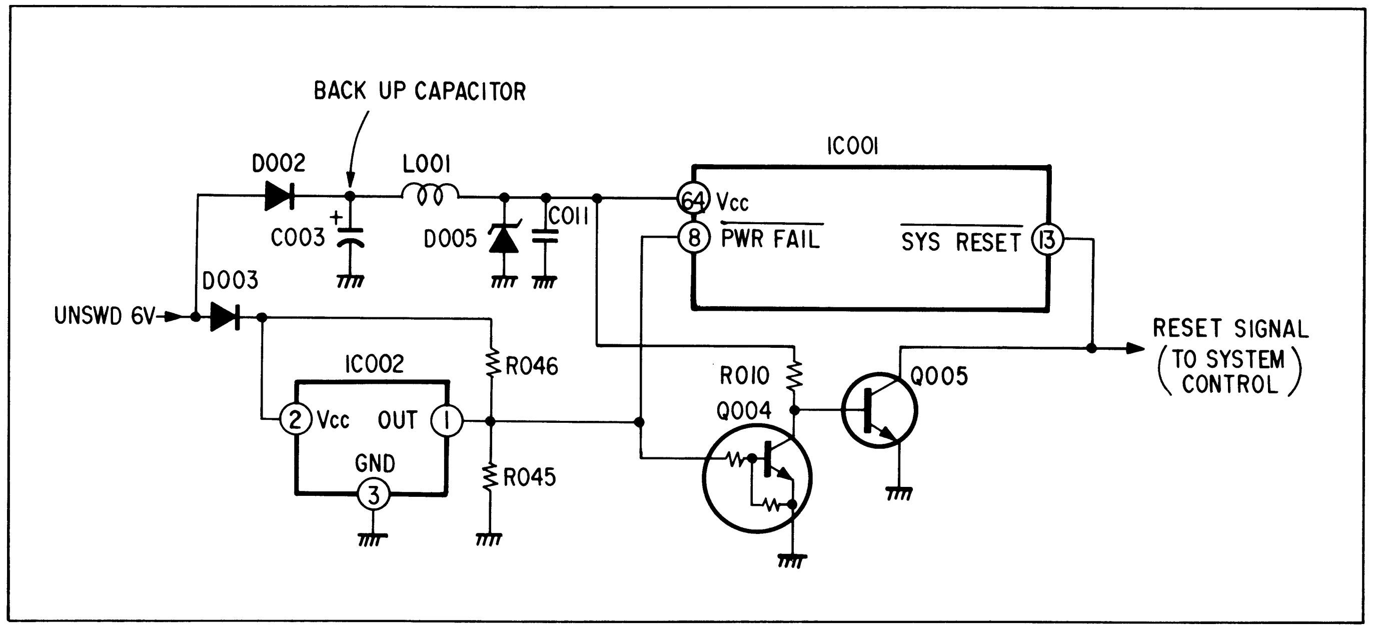

Fig. 6-3

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(a set of TM-57 baseboards, part No. 1-613-229-12)

When IC002 pin ② (VCC) of a voltage detective comparator is below about 4.5V, its output terminal pin ① converts from "H" to "L". At this moment, C013 is instantly discharged. Q004 turns off and Q005 turns on. And IC001 pin ⑧ ($\overline{\text{PWR FAIL}}$) converts to "L". Subsequently, when the power supply voltage recovers and the voltage detective comparator output (IC002 pin ①) converts from "L" to "H", the current flowing in the R046 will charge C013. For this reason, it takes C013 about 20 microseconds to be charged at a necessary level of voltage (about 1.2V) for Q004 to be turned on. No matter how short the charging time may be, whatever short pulse the voltage detective comparator output may be, the microcomputer timer (IC001) can surely detect any power failure because IC001 pin ⑧ ($\overline{\text{PWR FAIL}}$) is "L" for 20 microseconds.

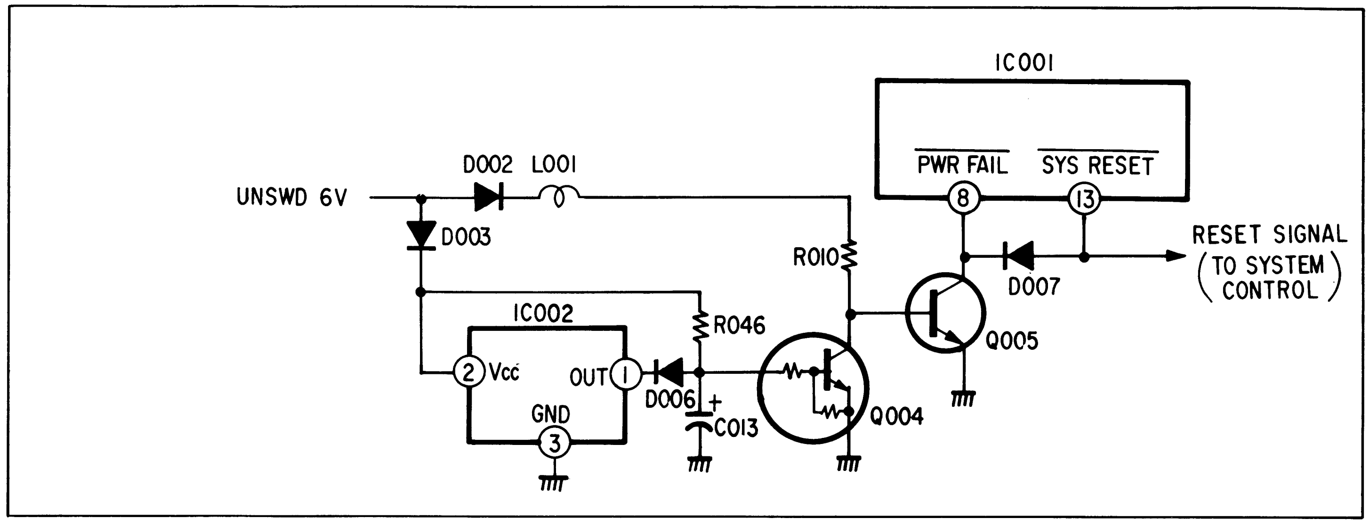

Fig. 6-4

6-5. OTHER CIRCUITS

L001, L002, and D005 protect IC001 against static electricity.

R024 and R025 set the bias voltage of the filament of the fluorescent vacuum display tube.

R026 through R044 are pull down resistors of the fluorescent display tube.

7. TUNER CIRCUIT

7-1. SIGNAL SYSTEM

The broadcast signals input from the AERIAL IN terminal are amplified approximately 4dB*[1] by the RFU (RF modulator, booster, and mixer*[2]) and are input to the RF input terminal of the tuner (sensitivity select switch: DX position).*[3]

The broadcase signals are output from the IF output terminal after being tuned, amplified, and frequency converted by the tuner. Each of the signals has two frequency components, namely, 38.9MHz*[4] as a picture carrier (fp), and 33.4MHz*[5] as a sound carrier (f_{S1}).

The signals are amplified by a preamplifier comprising Q001, T001 and T002 and are spectrum shaped by a surface acoustic wave filter (SAWF) SWF001.

The signals input to pins ① and ⑯ of IC001. The signal input to pins ① and ⑯ of IC001 is after amplified by the VIF AMP and is output from pin ⑫ of IC001 as a video signal after being SYNC filtered. The video signal is output to the video circuit through the voice trap CT001 (5.5MHz*[6] is attenuated approximately 50dB) and buffer Q002.

Pin ③ of IC001 is an input terminal for the voltage to set the RF AGC delay point. The RF AGC voltage is output to the tuner from pin ④. Pins ⑤ and ⑥ are output terminals for AFT signals. Pins ⑤ and ⑥ have inverse characteristics, and this equipment uses pin ⑤ only.

T004 connected to pins ⑧ and ⑨ is a VIF transformer. T005 connected to pins ⑦ and ⑩ is an AFT transformer. The 5.5MHz*[6] audio FM signal output from pin ⑫ pass through the 5.5MHz*[6] band pass filter CF001 and enter pin ⑧ of IC002. IC002 carries out FM audio detection. Detection is carried out by connecting a discriminator to pins ② and ③ and the output from pin ④ is fed to IC301.

7-2. TUNING SYSTEM

Tuning operations are controlled by IC005. Signals input to and output from IC005 are described below.

1) OSC IN (pin ② and OSC OUT (pin ③)

These pins are for clock oscillation. A 4MHz ceramic oscillating device is connected to them.

2) C0 (pin ⑧), C1 (pin ⑦), C2 (pin ⑥), C3 (pin ⑤), and I/O (pin ④)

C0 through C3 are control signals from IC005 to IC006 (non-vltatile memory). The I/O pin is an input/output pin for tuning data. When presetting the tuner, IC006 memorizes data of broadcasting stations being received (program No., receiving band, VC voltage, and AFC on/off) input from the I/O terminal of IC005 by means of the control signal from IC005. During tuning by the PROG +/– button or by the tuning signals from the timer circuit and remote commander, IC006 inputs program No. from the I/O pin of IC005 by the control signal received from IC005 and outputs the tuning data (receiving band, VC voltage, and AFC on/off) corresponding to the program No.

3) PR LOCK (pin ⑨)

The input signal from the timer circuit. This signal disabies changes of the program, etc. during recording (namely, PROG. UP/DN, RESET, AP, AFT +/–, SEARCH UP/DN, and AFT ON).

4) $\overline{\text{PR RST}}$ (pin ⑪ and $\overline{\text{PR UP}}$ (pin ⑩)

The input signals from the timer circuit. During timer recording, IC005 is reset to Program 1 by the $\overline{\text{PR RST}}$ pulse and is set to Program N when an N-1 quantity of $\overline{\text{PR UP}}$ pulses are subsequently input when the timer microcomputer selects Program N.

5) PWR (pin ⑫)

The tuner select signal output by the Q008 emitter is input to this pin.

IC005 decides the voltage to be the tuner ON mode (mode for the tuner to operate) when the level of the voltage is "H", deciding to be the tuner OFF mode (mode for the tuner not to operate) when the level is "L". IC005 stops the program No. display output and key matrix scan operation when in the tuner OFF mode.

6) P00 (pin ⑬), P01 (pin ⑭), P02 (pin ⑮), P03 (pin ㊶), P10 (pin ㊵), and P11 (pin ㊴)

The output signals to the timer circuit for program No. display. With signals P00 – P03, one digit of program No. display is output in a BCD code. With signals P10 – P11, the place of ten of program No. is output.

7) SYNC (pin ⑯)

The input signal from the video circuit. The SYNC signal separated from the video signal in the video circuits is input. In the tuner mode, IC101 decides broadcast signals have been received when this signal is input during search or auto program operation.

8) K0 (pin ⑳), K1 (pin ⑲), K2 (pin ⑱), K3 (pin ⑰) Sa (pin ㉔), Sb (pin ㉕), Sc (pin ㉖), and Sd (pin ㉗)

K0 through K3 are input signals for key matrix scan. Sa through Sd are output signals for the key matrix scan. Table 7-1 shows the preset switch matrix table.

	Sa	Sb	Sc	Sd
K0	30 PROG	PROG +	FINE –	
K1	4 BAND	PROG –	FINE +	AFT
K2	1 BAND		SEARCH –	RESET
K3	2 BAND		SEARCH +	AUTOMATIC PROGRAMMING

Table 7-1

The Sa output port is a switch to change the function depending on the destinations.

30 PROG. . .Connecting the ports Sa and K0 by a diode, the equipment can receive and display 30 programs. (For SL-F30PS/F60PS/F30EC/F60EC)

4 BAMD . . .Connecting the ports Sa and K1 by a diode, the equipment can receive and display four bands (CATV). The 30-program version can automatically be set up at this time without connecting. Port Sa with Port K0 by a diode, (For SL-F30PS/F60PS/R30EC/F60EC)

1 BAND . . .A one-band version is set up connecting Port Sa with Port K2 by a diode. (For (SL-F30UB)

2 BAND . . .A two-band version is set up connecting Port Sa with Port K3 by a diode. (For SL-F30SA/F60SA)

All the other switches have the same functions as those of conventional models. As a new function of this model, presetting of AFT to ON or OFF is possible. Presetting after pressing the FINE button, the mode is memorized as AFT OFF.

9) $\overline{\text{RST}}$ (pin ㉓)

An INITIAL RESET pulse is input by Q007 the moment the AC plug is plugged to the plug socket.

10) SD (pin ㉙)

The signal flashes LED D010 to show that the equipment is in operation when the set is in the SEARCH mode. During this mode, the program No. display also flashes at the same time.

11) AFT ON (pin ㉚)

D011 is lit during the AFT ON mode.

12) MUTE (pin ㉛)

This is an output signal.

The sound-signal muting signal when changing the program or in other cases. Muting is performed by IC303.

13) B1 (pin ㉝) and B2 (pin ㉜)

The signals to change the receiving band. These signals are decoded in IC003*[7] and are input to the tuner. IC003 also lights the band display LED*[7].

SIGNAL / BAND	B1	B2	I	III	U	III
VHF I	H	H	+12V	–12V	0V	–12V
VHF III	L	H	+12V	+12V	0V	–12V
UHF	H	L	0V	–12V	+12V	–12V
CATV	L	L	+12V	+12V	0V	+12V

Table 7-2

14) AFT (pin ㊲) and REF (pin ㊱)

The AFT pin is input with the AFT detection output of IC001. The REF pin is input with a reference voltage (a voltage obtained by dividing 12V by R050 and R051) to judge the polarity of AFT. When the AFT is ON, IC005 judges whether the received frequency is shifted toward +, or toward –, by these two input signals and controls the VC voltage to cancel the deviation.

The AFT is turned OFF by pressing the FINE button, turning ON by pressing the AFT button.

15) $\overline{\text{IR}}$ (pin ㊳)

The input signal from the remote commander.

IC005 accepts only those commands that are related to the tuner.

16) $\overline{\text{D/A}}$ (pin ㊷)

The $\overline{\text{D/A}}$ pin outputs the VC voltage with pulse-width modulated by a frequency at approximately 7.8kHz. A VC voltage is obtained by switching a DC voltage of 33V stabilized by IC004 and passing it through a low-pass filter composed of R044 and C055 after applying this signal to the Q005 base. Q006 is an active filter to remove ripple components in the VC voltage.

7-3. OTHER CIRCUITS

Q003 and Q004 switch on and off the tuner power by the TU SEL signal input from the timer circuit. The tuner power is output from the Q004 collector only when the level of the TU SEL signal is "H".

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*[1]. Approximately 3dB with SL-F30AS.

*[2]. The antenna switch with SL-F30AS, instead of the mixer.

*[3]. Not available with SL-F30AS.

*[4]. 39.5MHz with SL-F30UB.
36.875MHz with SL-F30AS.

*[5]. 33.5MHz with SL-F30UB.
31.375MHz with SL-F30AS.
32.9MHz with SL-F30/F60SA.

*[6]. 6MHz with SL-F30UB/F30SA/F60SA.
5.5MHz with SL-F30AS.

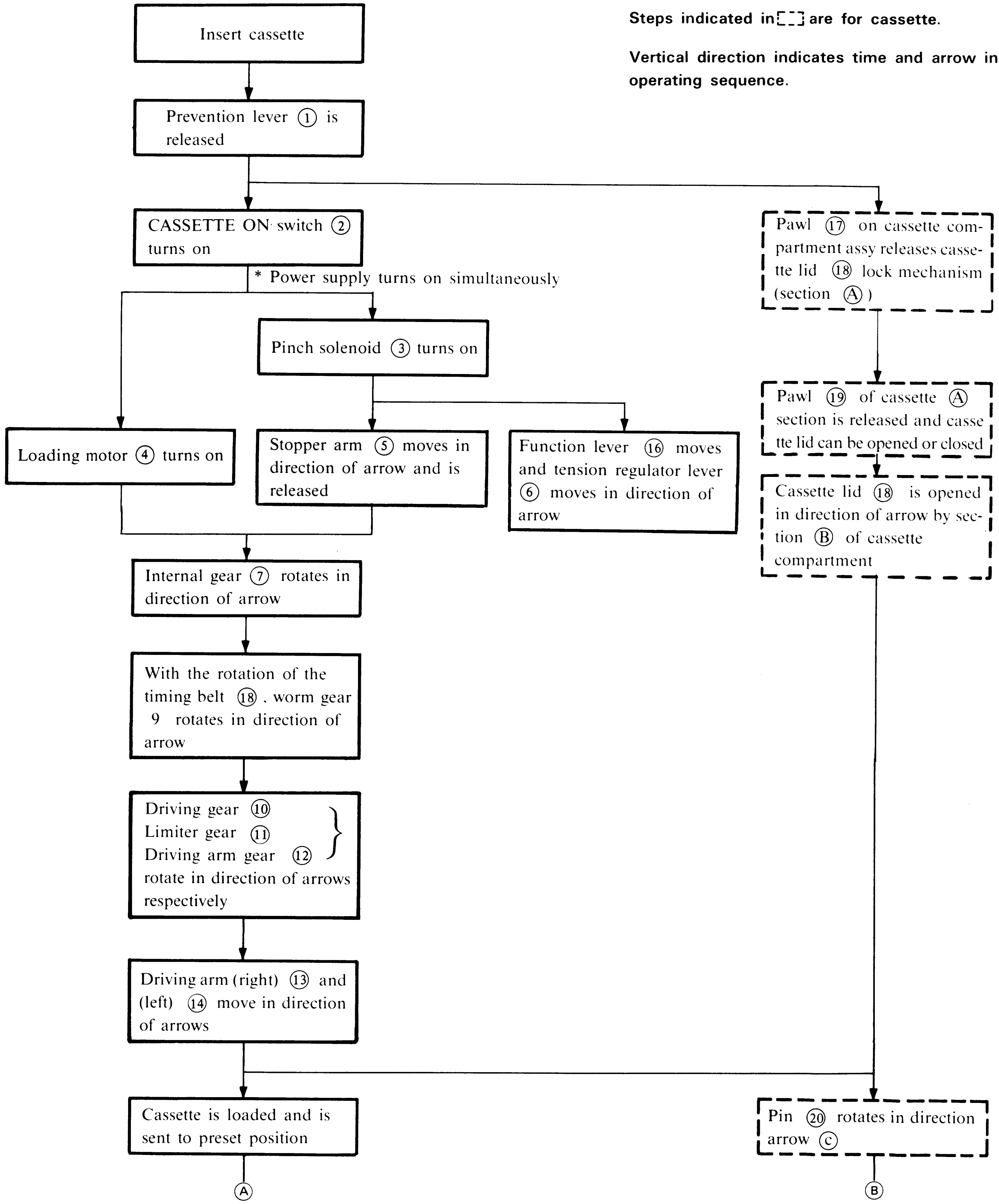
*[7]. Not available with SL-F30UB.

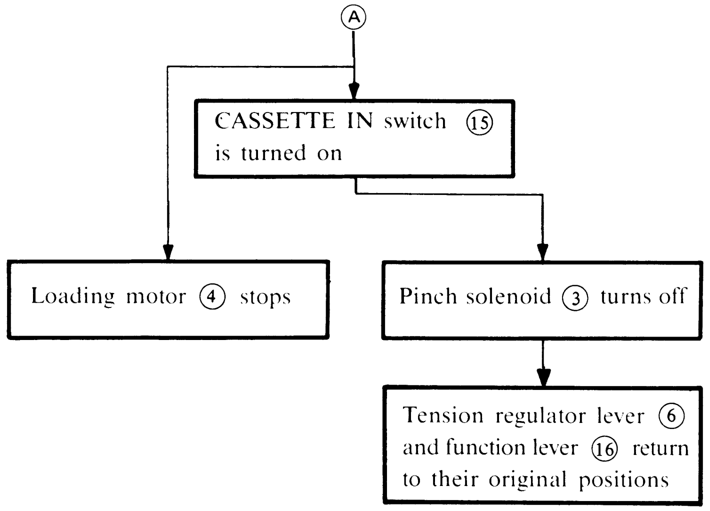
8. MECHANICAL DESCRIPTION

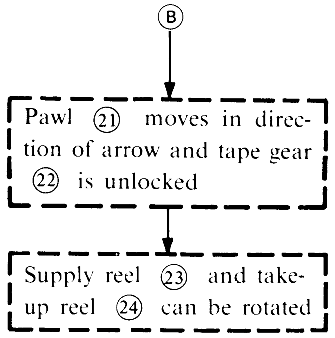
8-1. CASSETTE LOADING

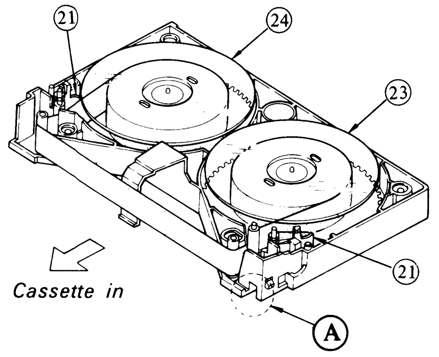
Steps indicated in [ ] are for cassette.

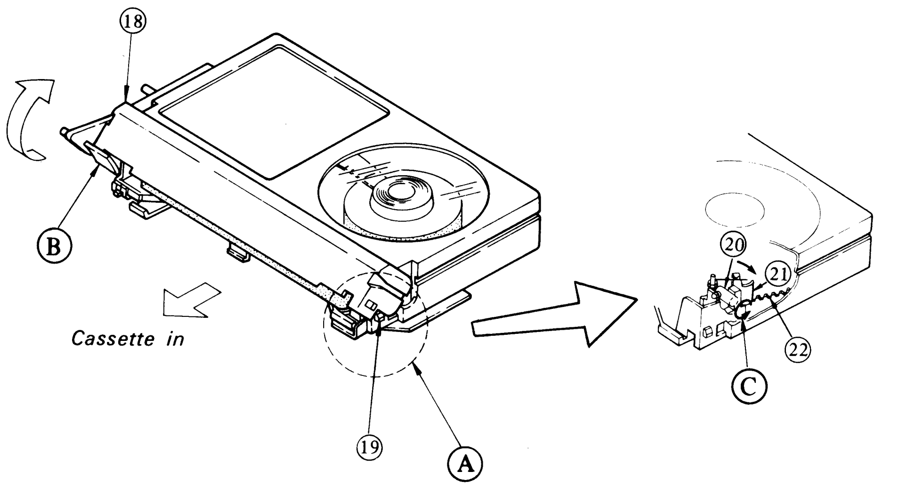
Vertical direction indicates time and arrow indicates operating sequence.

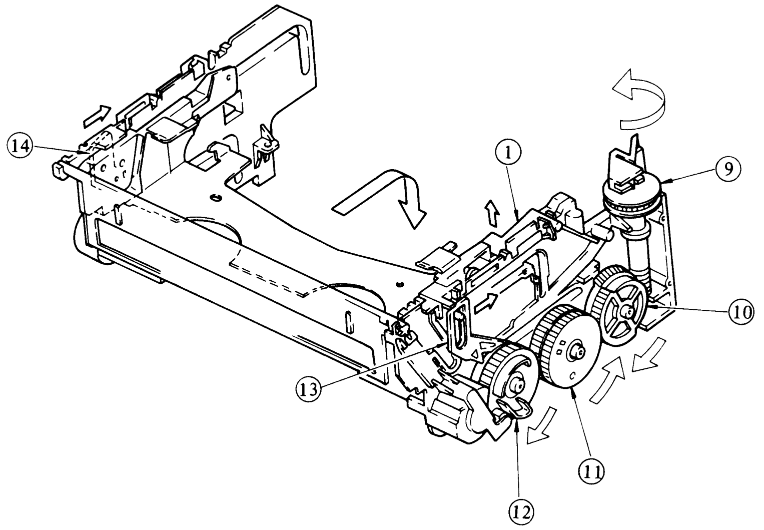

Insert cassette
Prevention lever ① is released
CASSETTE ON switch ② turns on
* Power supply turns on simultaneously
Pinch solenoid ③ turns on
Loading motor ④ turns on
Stopper arm ⑤ moves in direction of arrow and is released
Function lever ⑯ moves and tension regulator lever ⑥ moves in direction of arrow
Internal gear ⑦ rotates in direction of arrow
With the rotation of the timing belt ⑱ , worm gear 9 rotates in direction of arrow
Driving gear ⑩
Limiter gear ⑪
Driving arm gear ⑫
rotate in direction of arrows respectively
Driving arm (right) ⑬ and (left) ⑭ move in direction of arrows
Cassette is loaded and is sent to preset position
Ⓐ
Pawl ⑰ on cassette compartment assy releases cassette lid ⑱ lock mechanism (section Ⓐ)
Pawl ⑲ of cassette Ⓐ section is released and cassette lid can be opened or closed
Cassette lid ⑱ is opened in direction of arrow by section Ⓑ of cassette compartment
Pin ⑳ rotates in direction arrow ⓒ
Ⓑ

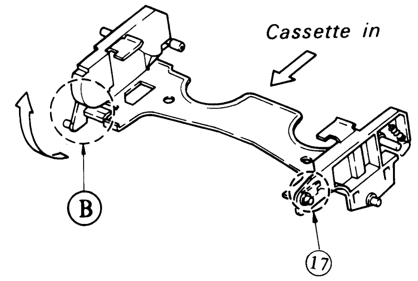

Ⓐ
CASSETTE IN switch ⑮ is turned on
Loading motor ④ stops
Pinch solenoid ③ turns off
Tension regulator lever ⑥ and function lever ⑯ return to their original positions

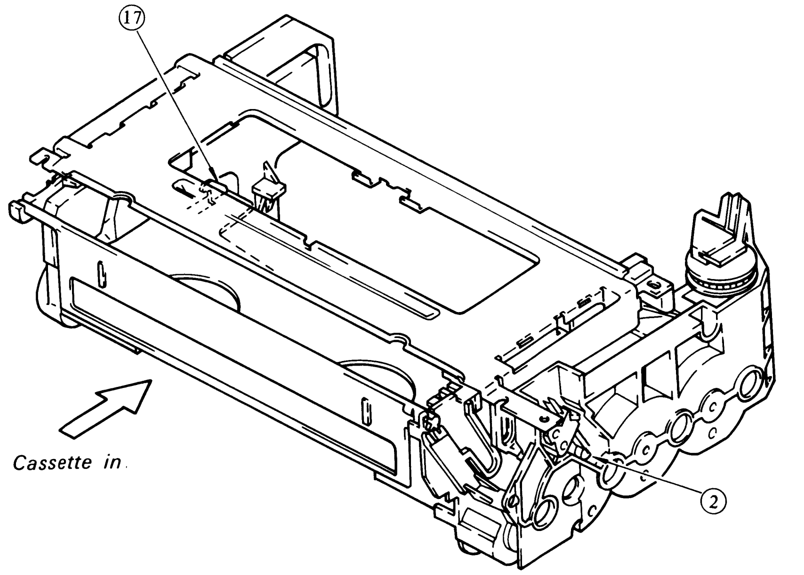

Ⓑ
Pawl ㉑ moves in direction of arrow and tape gear ㉒ is unlocked
Supply reel ㉓ and take-up reel ㉔ can be rotated

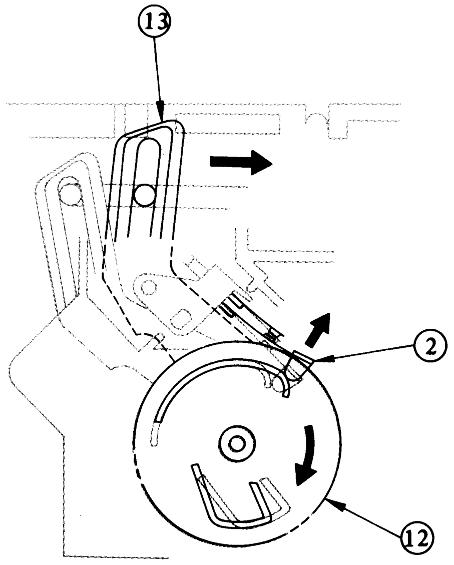

㉑
㉔
㉓
㉑
Cassette in
Ⓐ

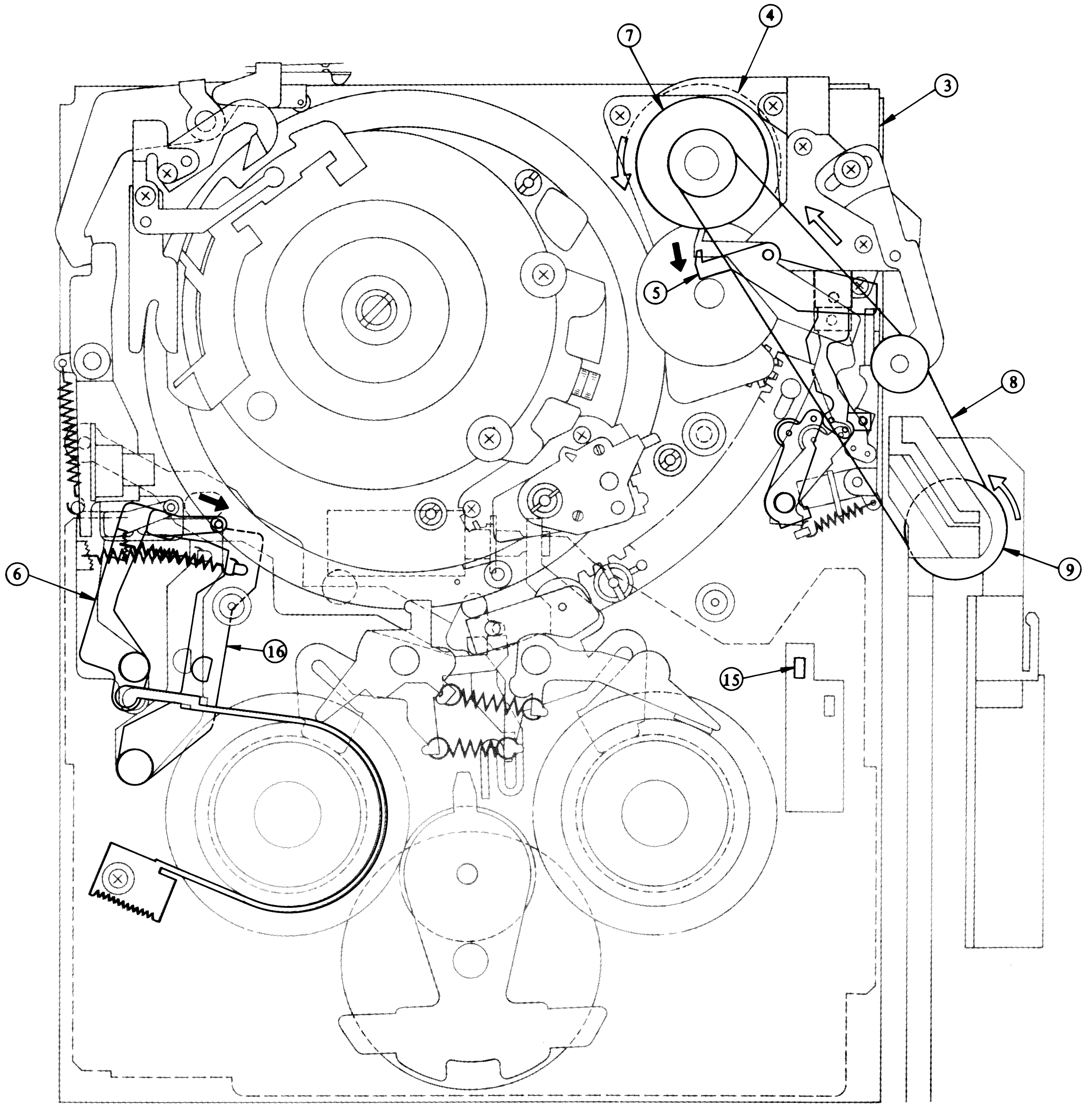

⑱
Ⓑ
Cassette in
⑲
Ⓐ
⑳
㉑
㉒
Ⓒ


⑭
①
⑨
⑩
⑬
⑪
⑫


Cassette in
Ⓑ
⑰


⑰
Cassette in
②


⑬
②
⑫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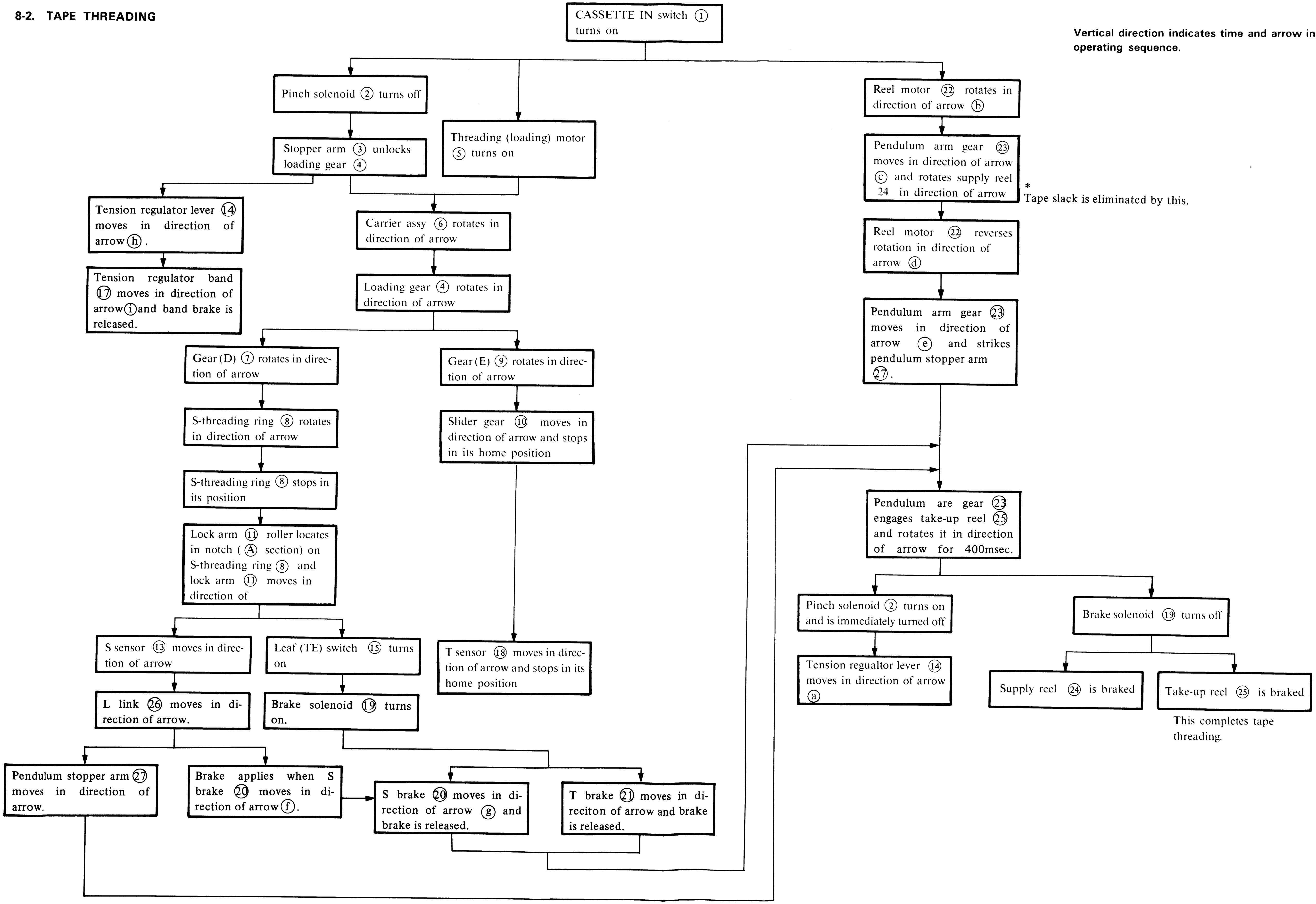
⑨
⑮

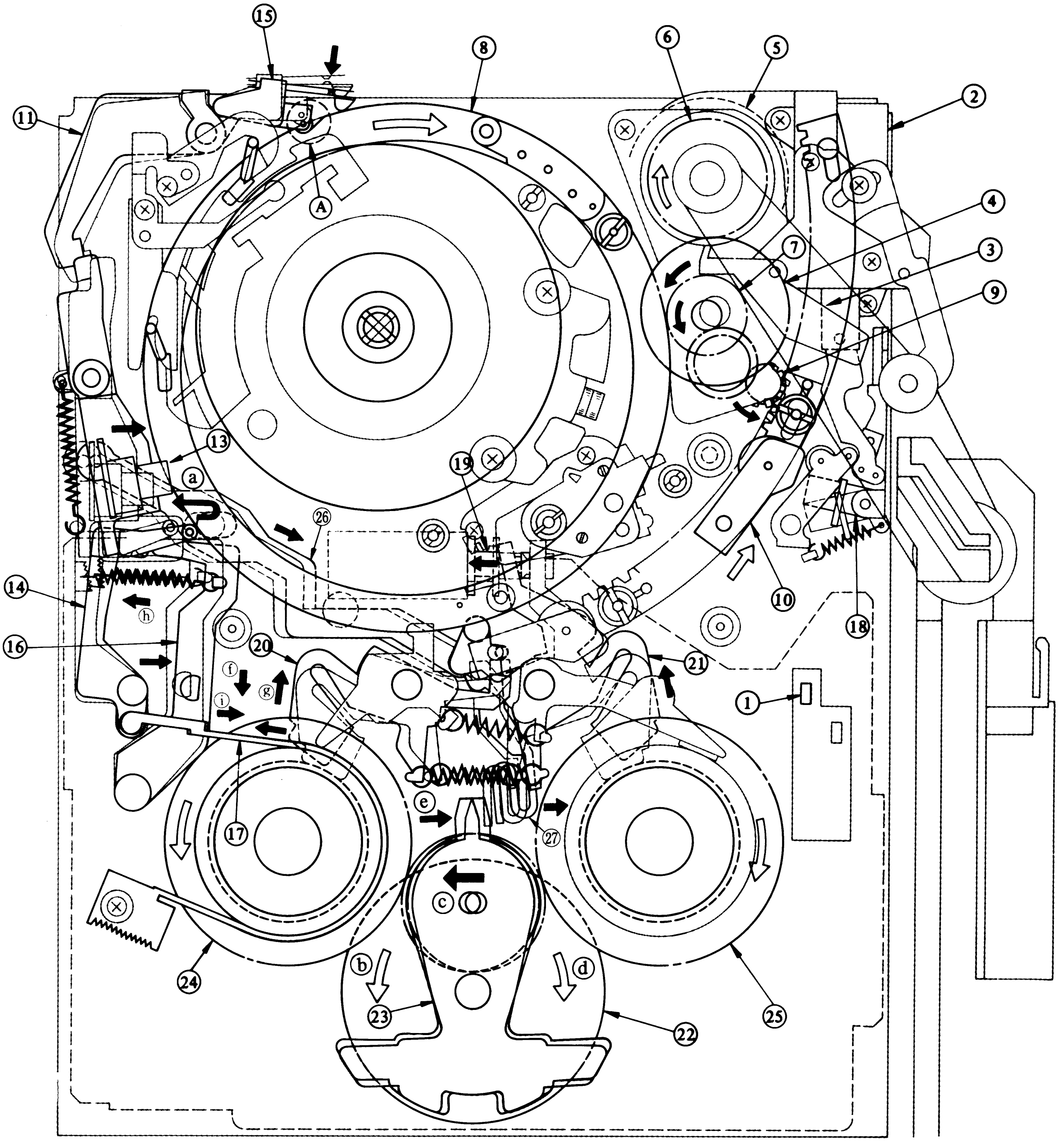
8-2. TAPE THREADING

Vertical direction indicates time and arrow indicates operating sequence.


CASSETTE IN switch ① turns on
Pinch solenoid ② turns off
Stopper arm ③ unlocks loading gear ④
Threading (loading) motor ⑤ turns on
Tension regulator lever ⑭ moves in direction of arrow ⓗ.
Tension regulator band ⑰ moves in direction of arrowⓘand band brake is released.
Carrier assy ⑥ rotates in direction of arrow
Loading gear ④ rotates in direction of arrow
Gear (D) ⑦ rotates in direction of arrow
S-threading ring ⑧ rotates in direction of arrow
S-threading ring ⑧ stops in its position
Lock arm ⑪ roller locates in notch (Ⓐ section) on S-threading ring ⑧ and lock arm ⑪ moves in direction of
S sensor ⑬ moves in direction of arrow
L link ㉖ moves in direction of arrow.
Pendulum stopper arm ㉗ moves in direction of arrow.
Brake applies when S brake ⑳ moves in direction of arrowⓕ.
Leaf (TE) switch ⑮ turns on
Brake solenoid ⑲ turns on.
S brake ⑳ moves in direction of arrow ⓖ and brake is released.
T brake ㉑ moves in direciton of arrow and brake is released.
Gear (E) ⑨ rotates in direction of arrow
Slider gear ⑩ moves in direction of arrow and stops in its home position
T sensor ⑱ moves in direction of arrow and stops in its home position
Reel motor ㉒ rotates in direction of arrow ⓑ
Pendulum arm gear ㉓ moves in direction of arrow ⓒ and rotates supply reel 24 in direction of arrow
Reel motor ㉒ reverses rotation in direction of arrow ⓓ
Pendulum arm gear ㉓ moves in direction of arrow ⓔ and strikes pendulum stopper arm ㉗.
Pendulum are gear ㉓ engages take-up reel ㉕ and rotates it in direction of arrow for 400msec.
Pinch solenoid ② turns on and is immediately turned off
Tension regualtor lever ⑭ moves in direction of arrow ⓐ
Brake solenoid ⑲ turns off
Supply reel ㉔ is braked
Take-up reel ㉕ is braked

* Tape slack is eliminated by this.

This completes tape threading.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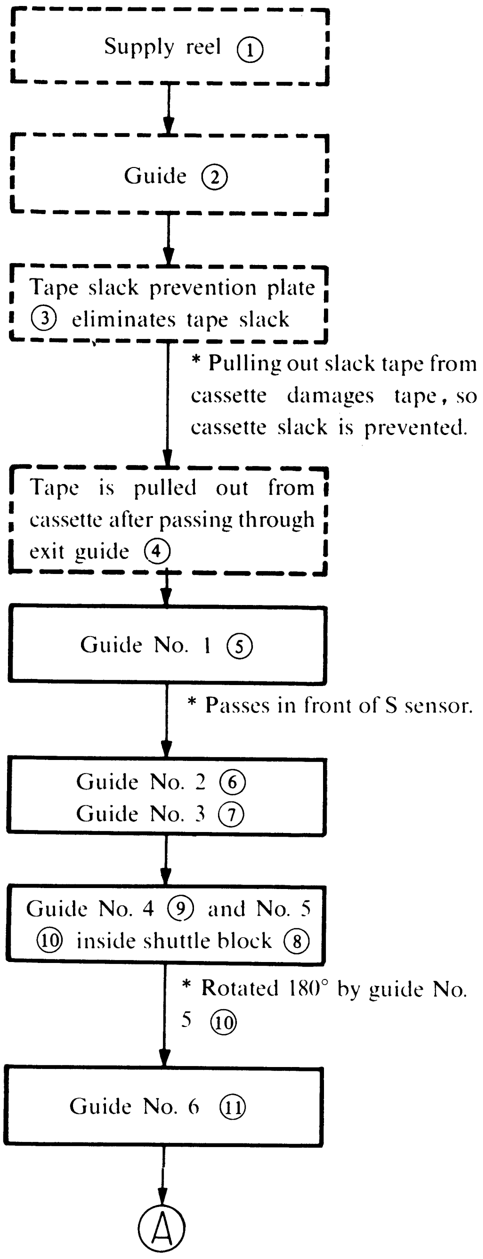
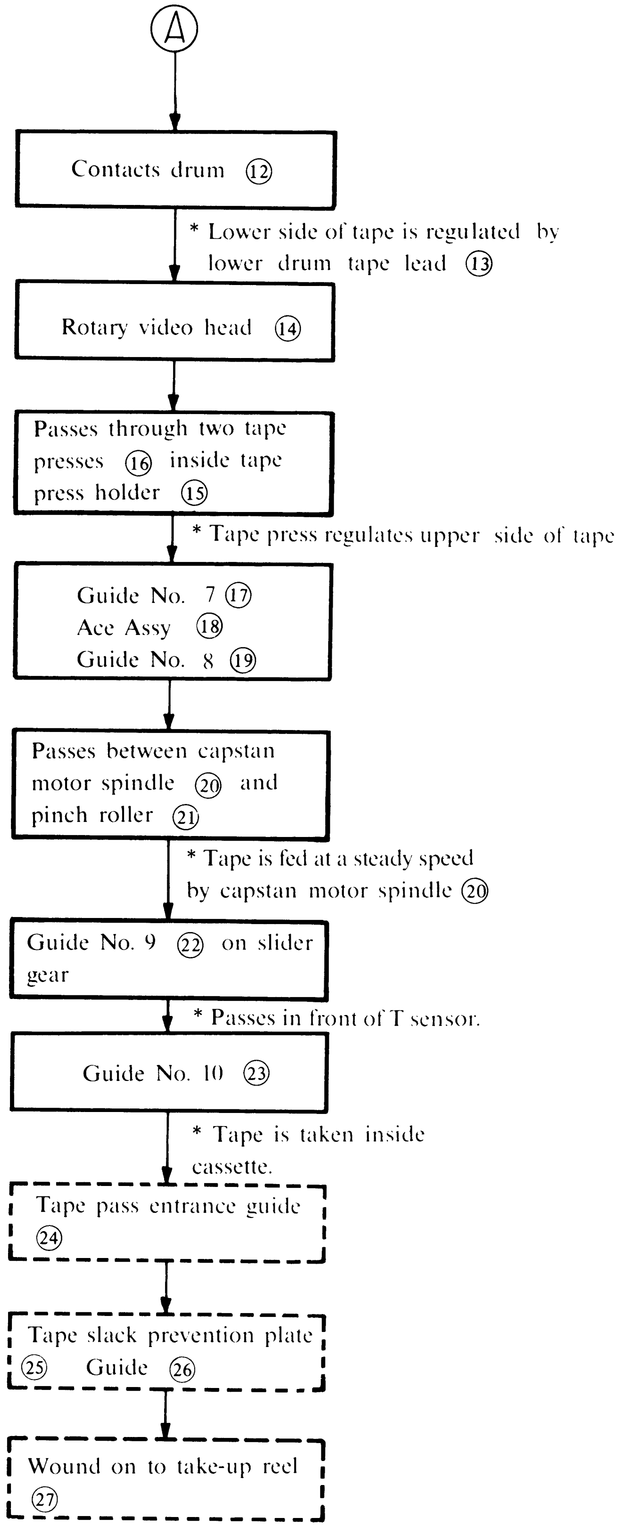
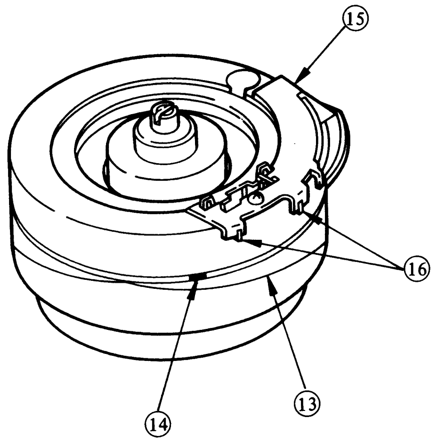
8-3. TAPE PATH

**Steps indicated in [- - -] are for cassette.
Vertical direction indicates time and arrow indicates operating sequence.**


Supply reel ①
Guide ②
Tape slack prevention plate ③ eliminates tape slack
* Pulling out slack tape from cassette damages tape, so cassette slack is prevented.
Tape is pulled out from cassette after passing through exit guide ④
Guide No. 1 ⑤
* Passes in front of S sensor.
Guide No. 2 ⑥
Guide No. 3 ⑦
Guide No. 4 ⑨ and No. 5 ⑩ inside shuttle block ⑧
* Rotated 180° by guide No. 5 ⑩
Guide No. 6 ⑪
Ⓐ


Ⓐ
Contacts drum ⑫
* Lower side of tape is regulated by lower drum tape lead ⑬
Rotary video head ⑭
Passes through two tape presses ⑯ inside tape press holder ⑮
* Tape press regulates upper side of tape
Guide No. 7 ⑰
Ace Assy ⑱
Guide No. 8 ⑲
Passes between capstan motor spindle ⑳ and pinch roller ㉑
* Tape is fed at a steady speed by capstan motor spindle ⑳
Guide No. 9 ㉒ on slider gear
* Passes in front of T sensor.
Guide No. 10 ㉓
* Tape is taken inside cassette.
Tape pass entrance guide ㉔
Tape slack prevention plate ㉕ Guide ㉖
Wound on to take-up reel ㉗


⑮
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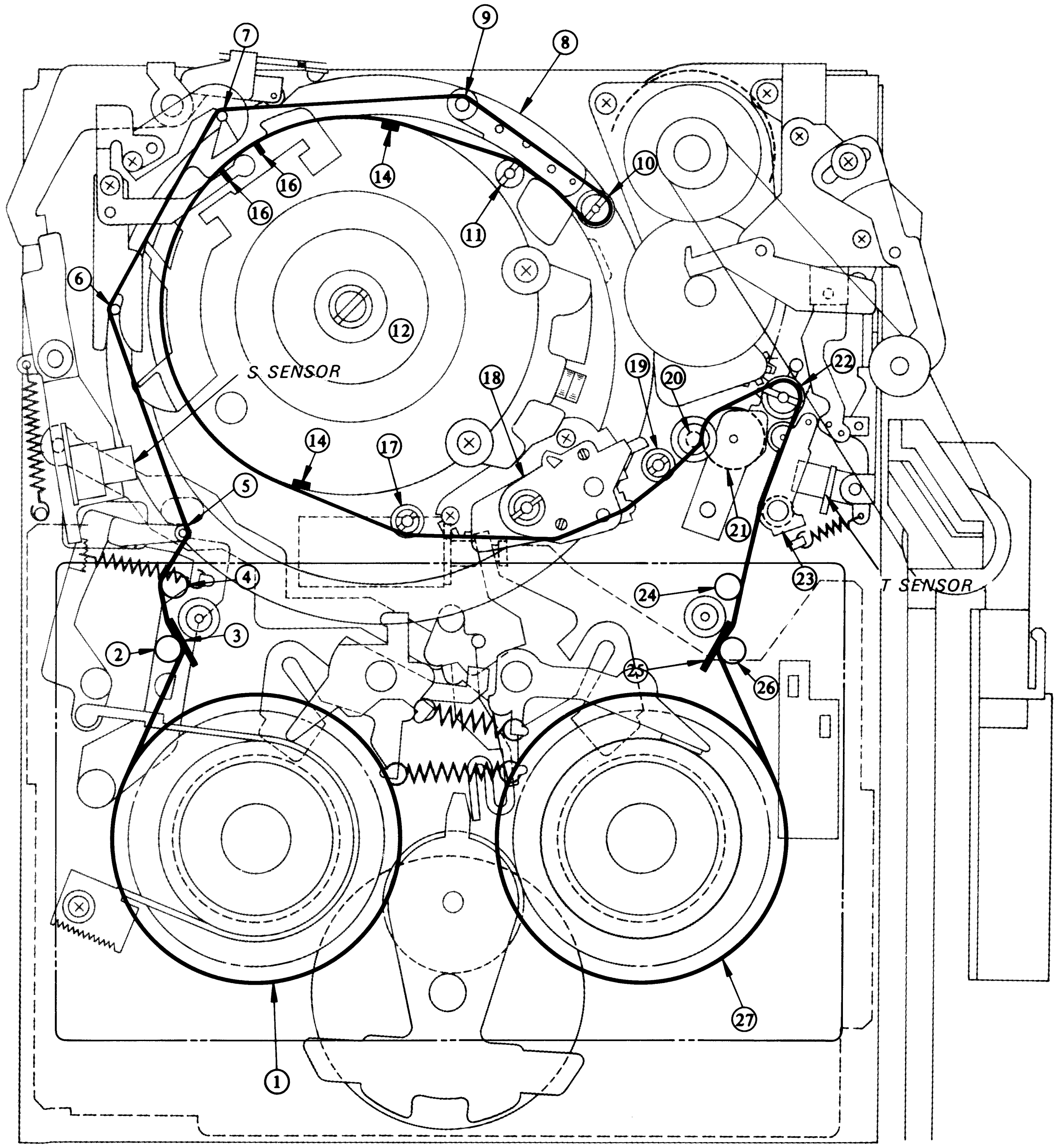
⑬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S. SENSOR
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T SENSOR
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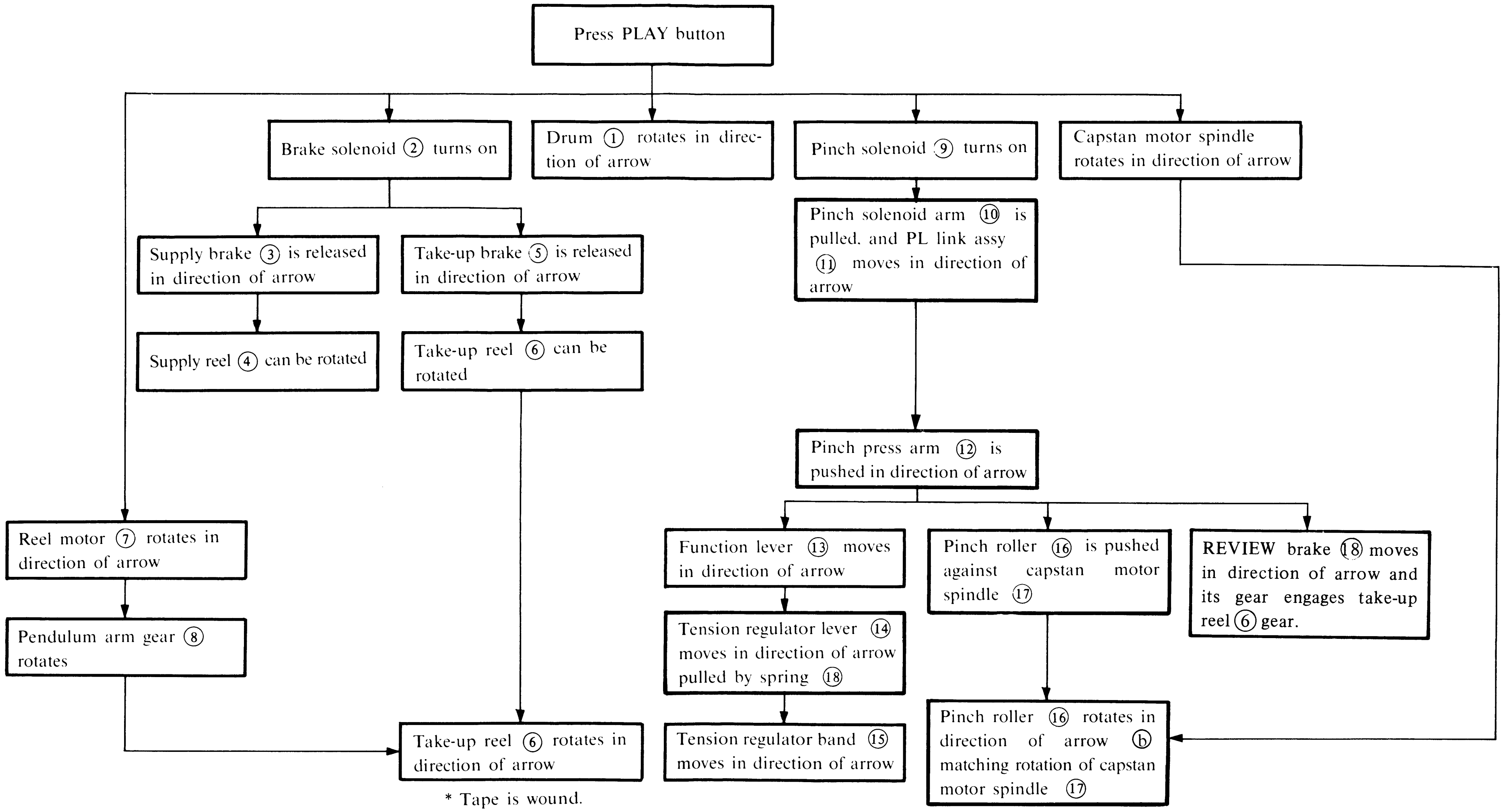
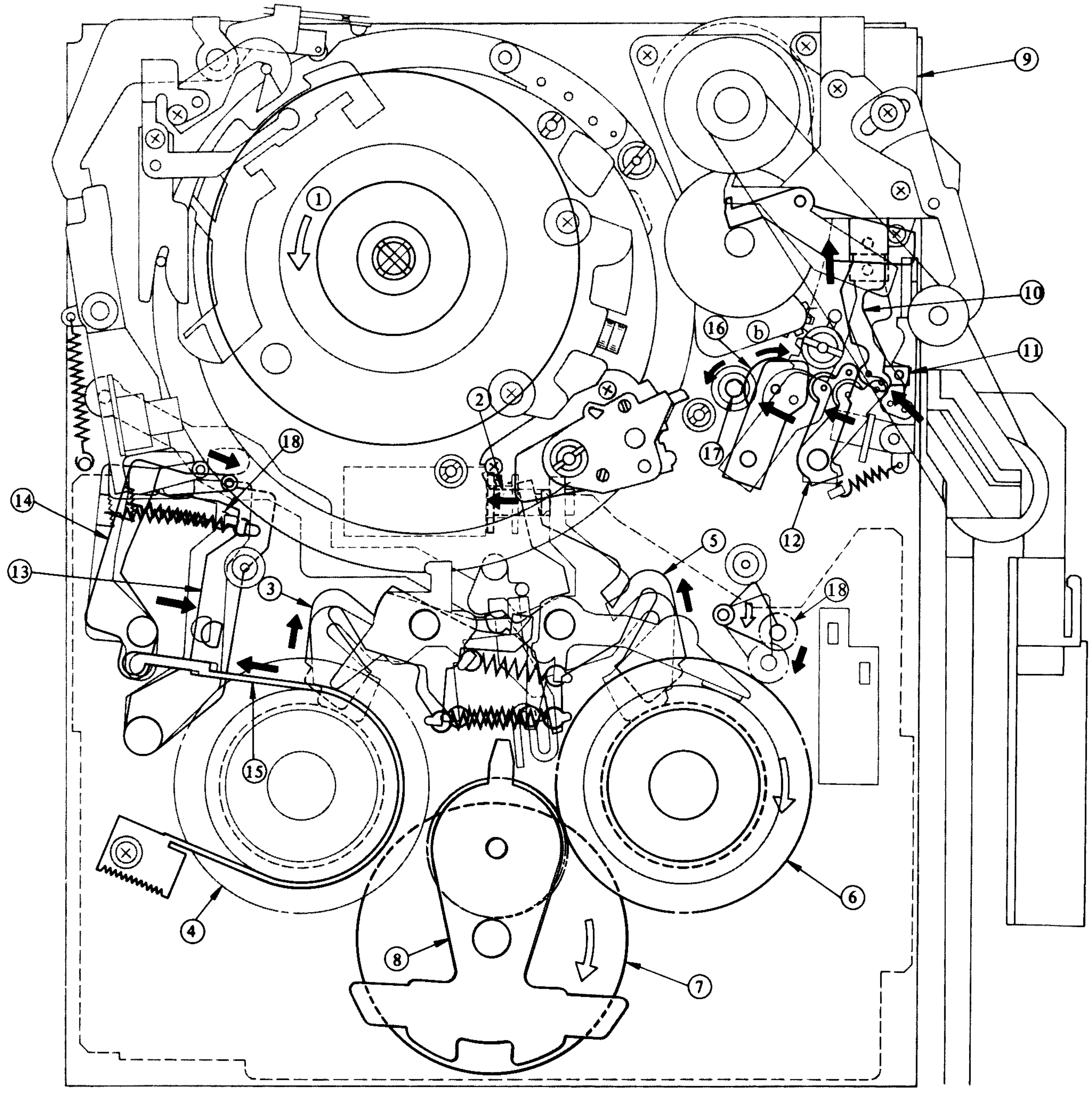
㉗

8-4. PLAY MODE

Vertical direction indicates time and arrow indicates operating sequence.


Press PLAY button
Brake solenoid ② turns on
Drum ① rotates in direction of arrow
Pinch solenoid ⑨ turns on
Capstan motor spindle rotates in direction of arrow
Supply brake ③ is released in direction of arrow
Take-up brake ⑤ is released in direction of arrow
Pinch solenoid arm ⑩ is pulled, and PL link assy ⑪ moves in direction of arrow
Supply reel ④ can be rotated
Take-up reel ⑥ can be rotated
Pinch press arm ⑫ is pushed in direction of arrow
Reel motor ⑦ rotates in direction of arrow
Function lever ⑬ moves in direction of arrow
Pinch roller ⑯ is pushed against capstan motor spindle ⑰
REVIEW brake ⑱ moves in direction of arrow and its gear engages take-up reel ⑥ gear.
Pendulum arm gear ⑧ rotates
Tension regulator lever ⑭ moves in direction of arrow pulled by spring ⑱
Take-up reel ⑥ rotates in direction of arrow
Tension regulator band ⑮ moves in direction of arrow
Pinch roller ⑯ rotates in direction of arrow ⓑ matching rotation of capstan motor spindle ⑰

* Tape is wound.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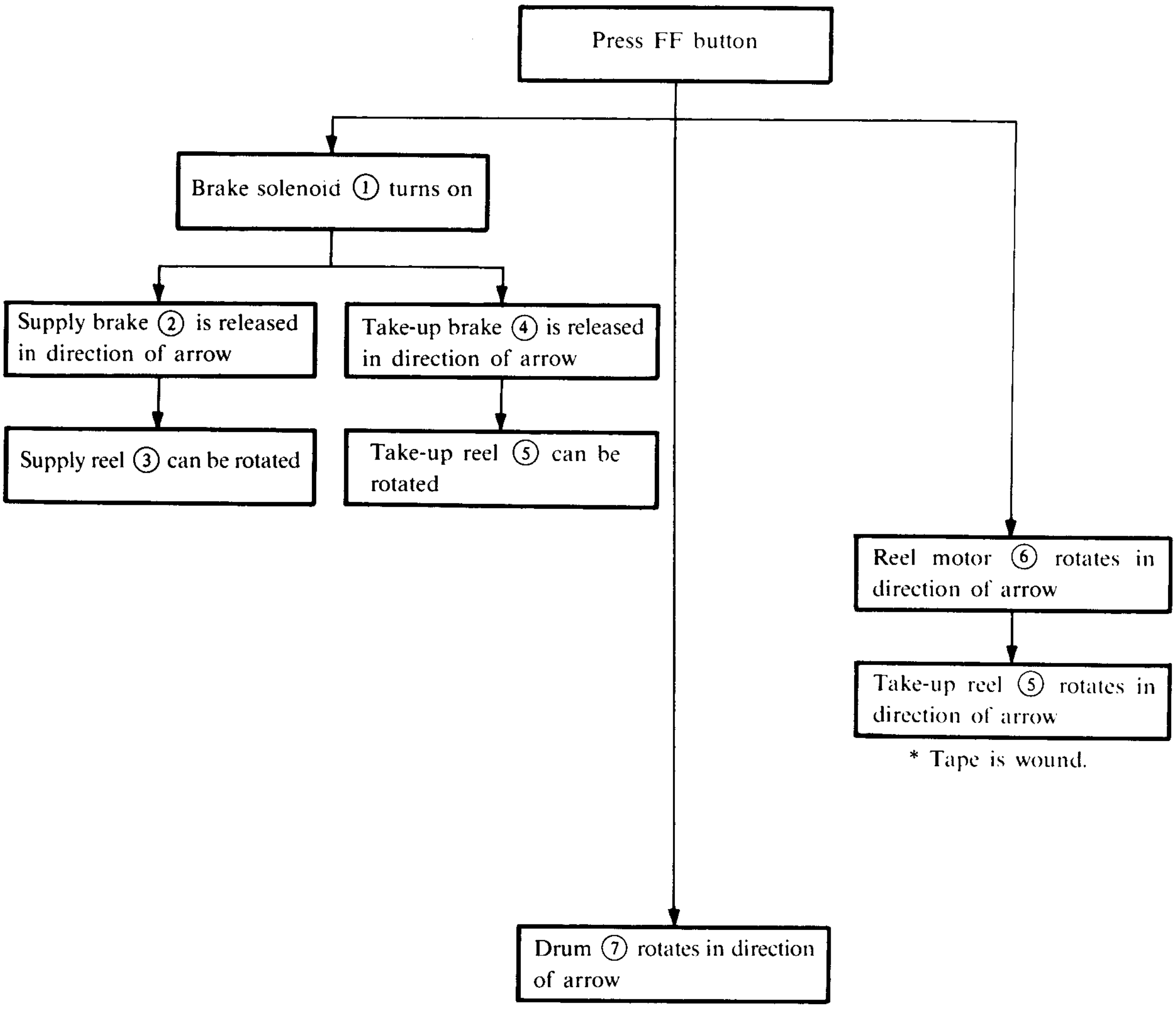
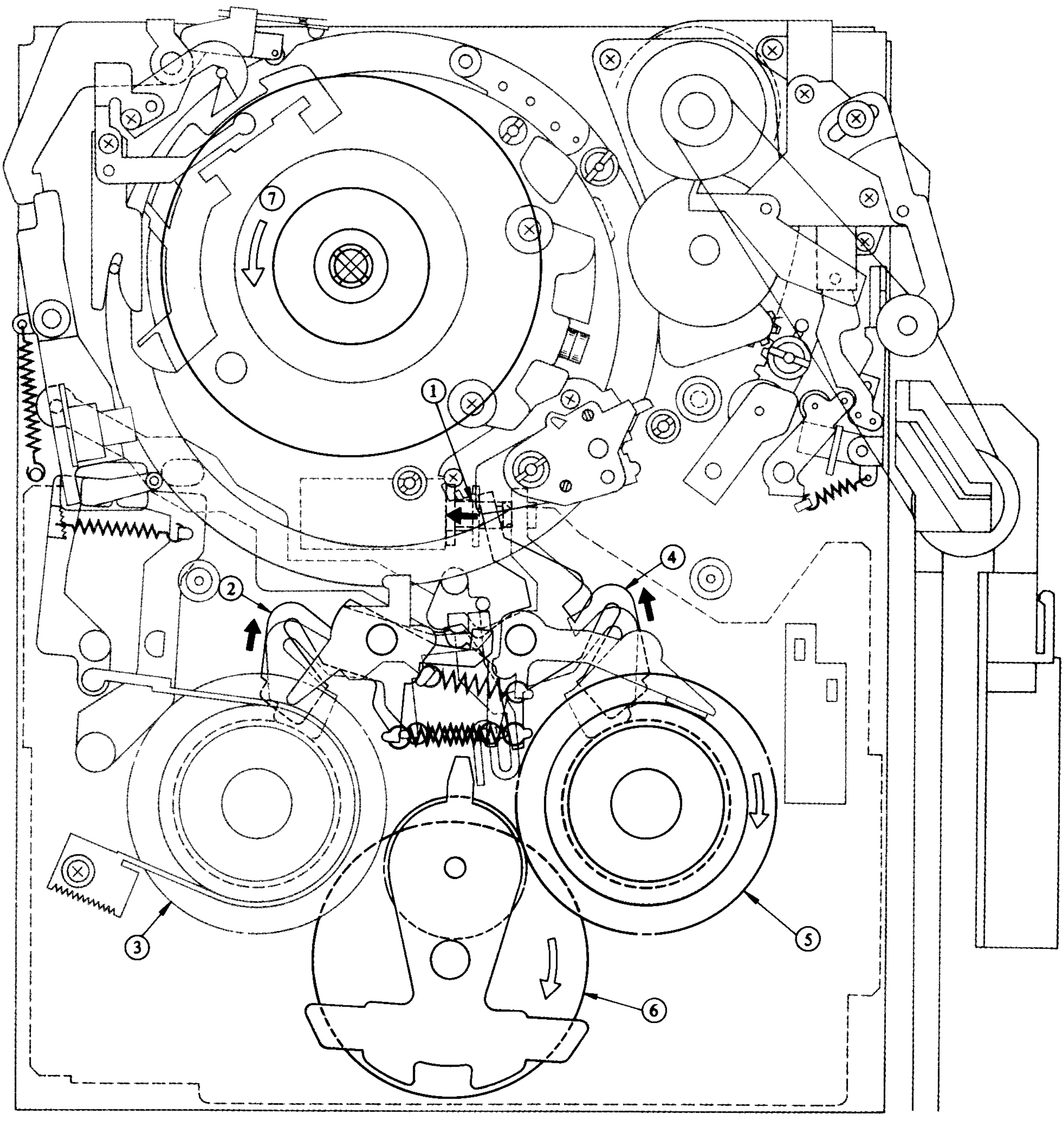
⑱
b

8-5. FF MODE

Vertical direction indicates time and arrow indicates operating sequence.


Press FF button
Brake solenoid ① turns on
Supply brake ② is released in direction of arrow
Take-up brake ④ is released in direction of arrow
Supply reel ③ can be rotated
Take-up reel ⑤ can be rotated
Reel motor ⑥ rotates in direction of arrow
Take-up reel ⑤ rotates in direction of arrow
* Tape is wound.
Drum ⑦ rotates in direction of arrow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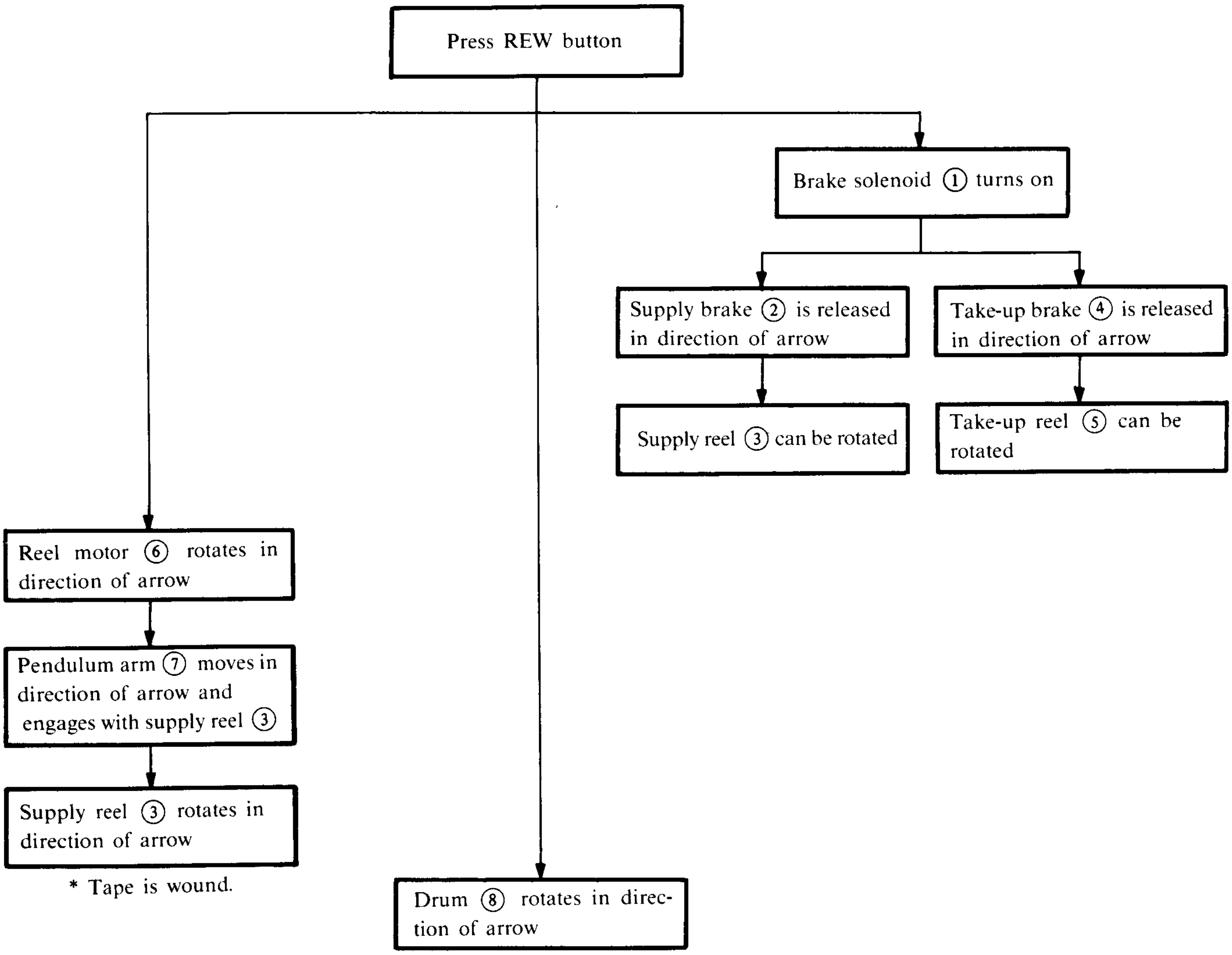
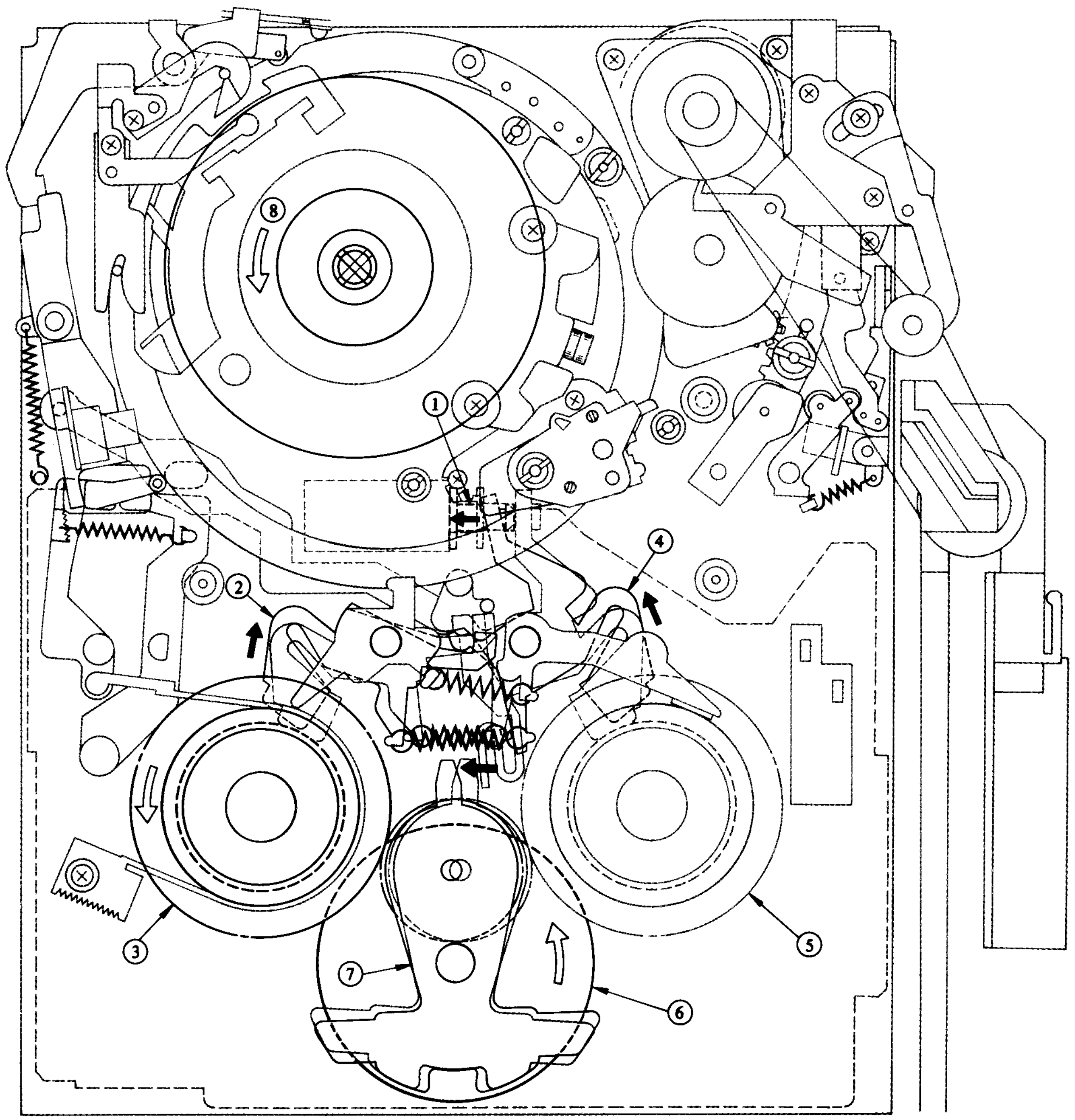
8-6. REW MODE

Vertical direction indicates time and arrow indicates operating sequence.


Press REW button
Brake solenoid ① turns on
Supply brake ② is released in direction of arrow
Take-up brake ④ is released in direction of arrow
Supply reel ③ can be rotated
Take-up reel ⑤ can be rotated
Reel motor ⑥ rotates in direction of arrow
Pendulum arm ⑦ moves in direction of arrow and engages with supply reel ③
Supply reel ③ rotates in direction of arrow
* Tape is wound.
Drum ⑧ rotates in direction of arrow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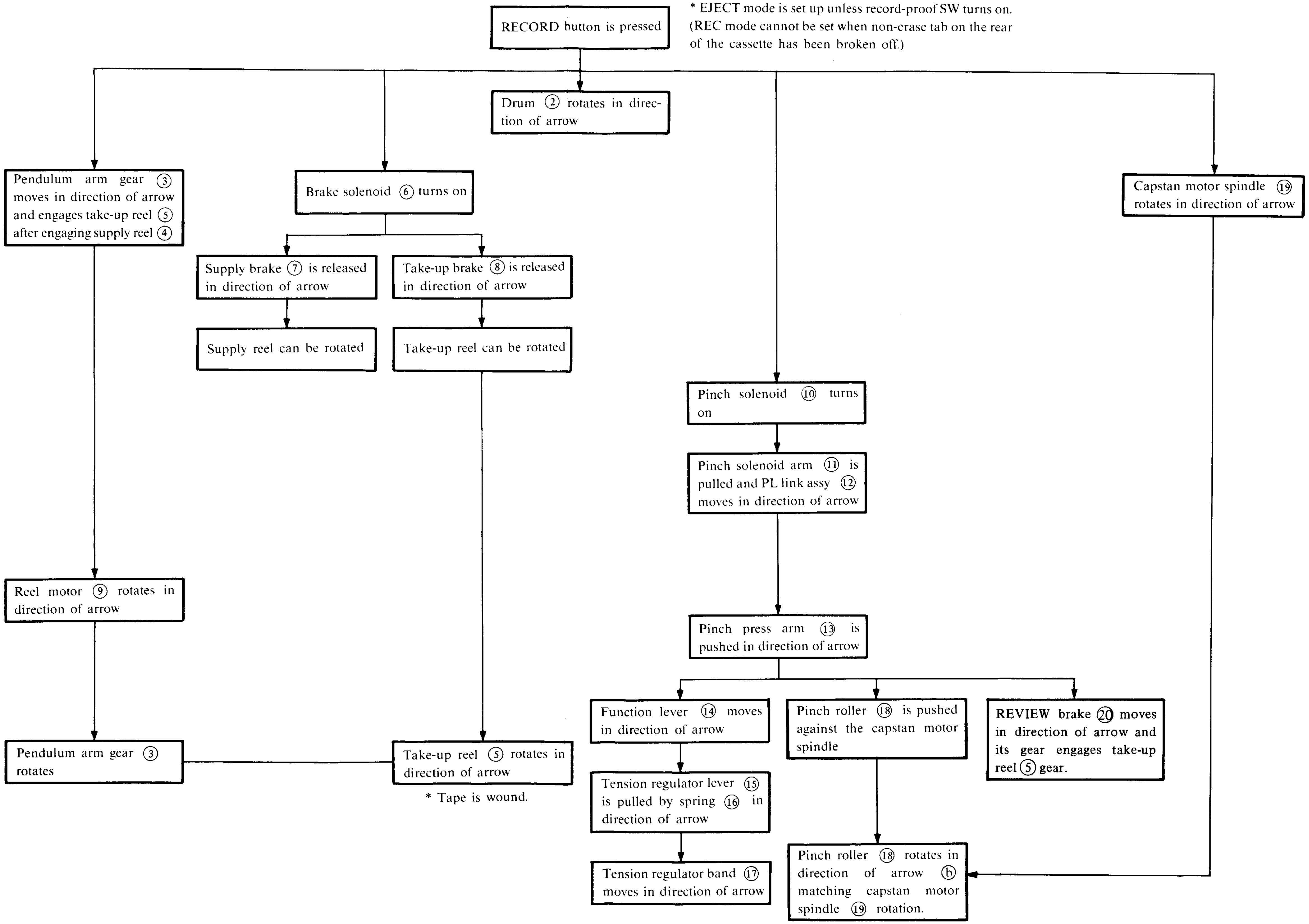
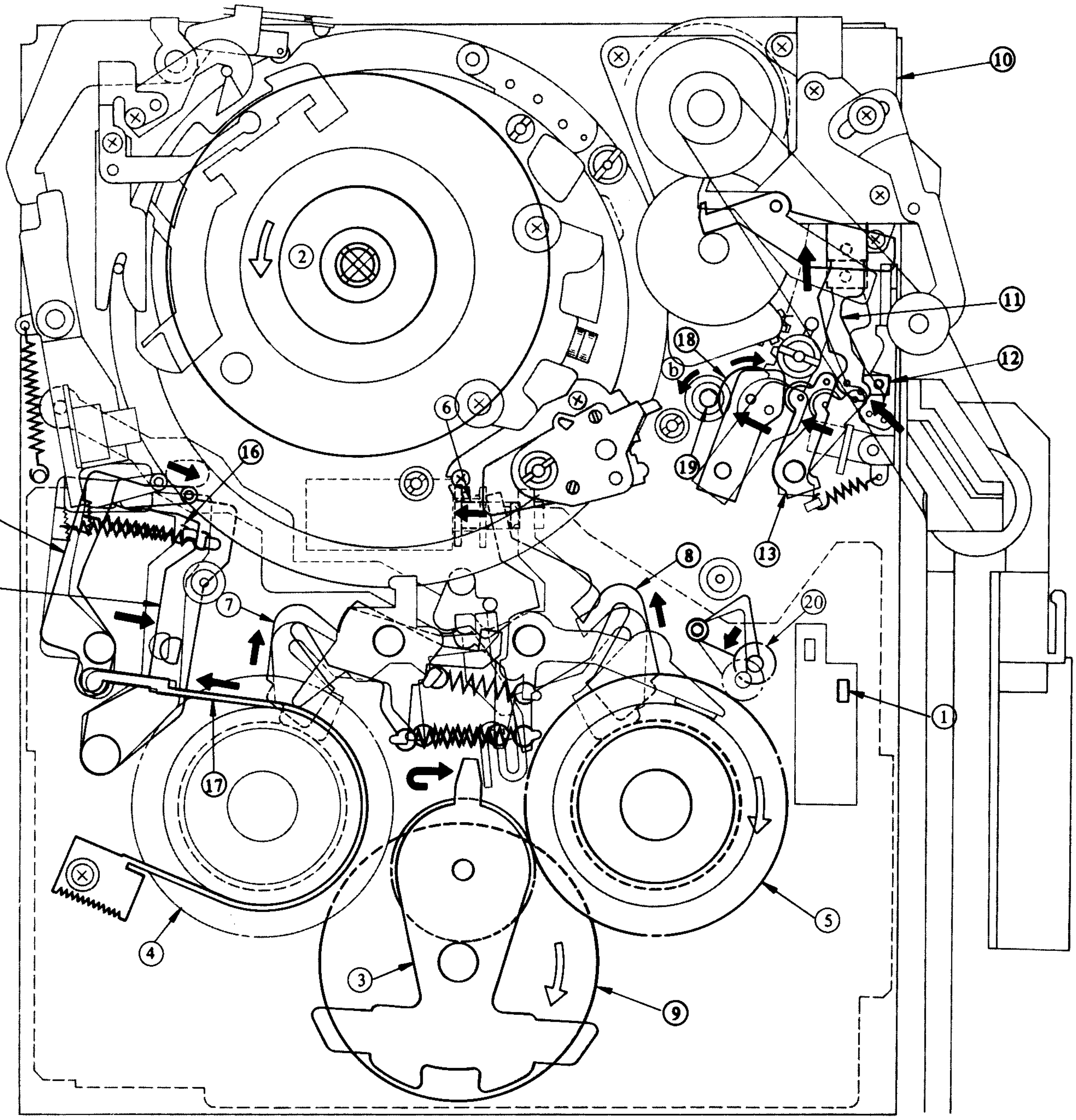
8-7. RECORD MODE

Vertical direction indicates time and arrow indicates operating sequence.



* EJECT mode is set up unless record-proof SW turns on. (REC mode cannot be set when non-erase tab on the rear of the cassette has been broken off.)

RECORD button is pressed
Drum ② rotates in direction of arrow
Pendulum arm gear ③ moves in direction of arrow and engages take-up reel ⑤ after engaging supply reel ④
Brake solenoid ⑥ turns on
Supply brake ⑦ is released in direction of arrow
Take-up brake ⑧ is released in direction of arrow
Supply reel can be rotated
Take-up reel can be rotated
Pinch solenoid ⑩ turns on
Pinch solenoid arm ⑪ is pulled and PL link assy ⑫ moves in direction of arrow
Capstan motor spindle ⑲ rotates in direction of arrow
Reel motor ⑨ rotates in direction of arrow
Pinch press arm ⑬ is pushed in direction of arrow
Function lever ⑭ moves in direction of arrow
Pinch roller ⑱ is pushed against the capstan motor spindle
REVIEW brake ⑳ moves in direction of arrow and its gear engages take-up reel ⑤ gear.
Pendulum arm gear ③ rotates
Take-up reel ⑤ rotates in direction of arrow
* Tape is wound.
Tension regulator lever ⑮ is pulled by spring ⑯ in direction of arrow
Tension regulator band ⑰ moves in direction of arrow
Pinch roller ⑱ rotates in direction of arrow ⓑ matching capstan motor spindle ⑲ rotation.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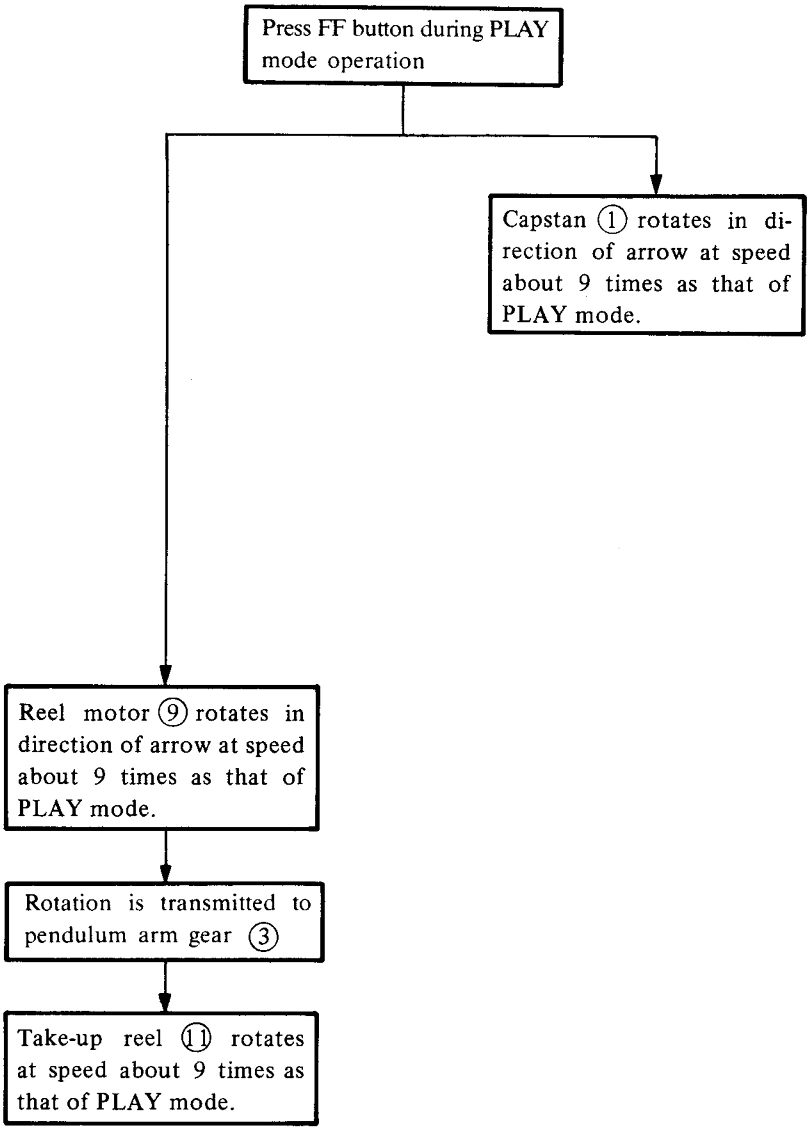
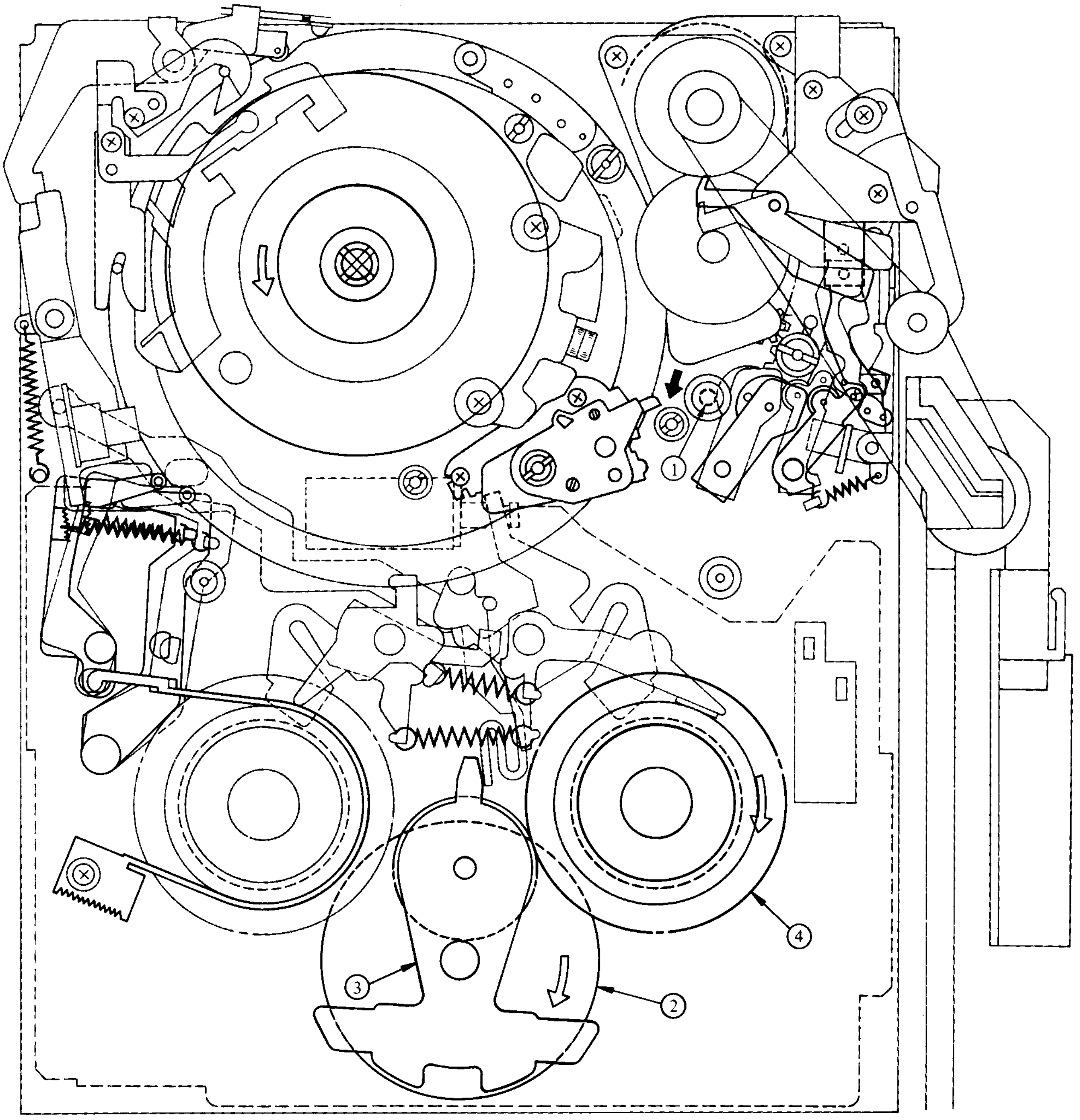
8-8. PICTURE SEARCH (CUE)

Picture search
CUE/REVIEW is a capstan drive (in the state of pressing pinch roller).

Vertical direction indicates time and arrow indicates operating sequence


Press FF button during PLAY mode operation
Capstan ① rotates in direction of arrow at speed about 9 times as that of PLAY mode.
Reel motor ⑨ rotates in direction of arrow at speed about 9 times as that of PLAY mode.
Rotation is transmitted to pendulum arm gear ③
Take-up reel ⑪ rotates at speed about 9 times as that of PLAY mode.

* Shifting to FF mode is done only when this button remains pushed. When finger is taken out from FF button it returns to PLAY mode.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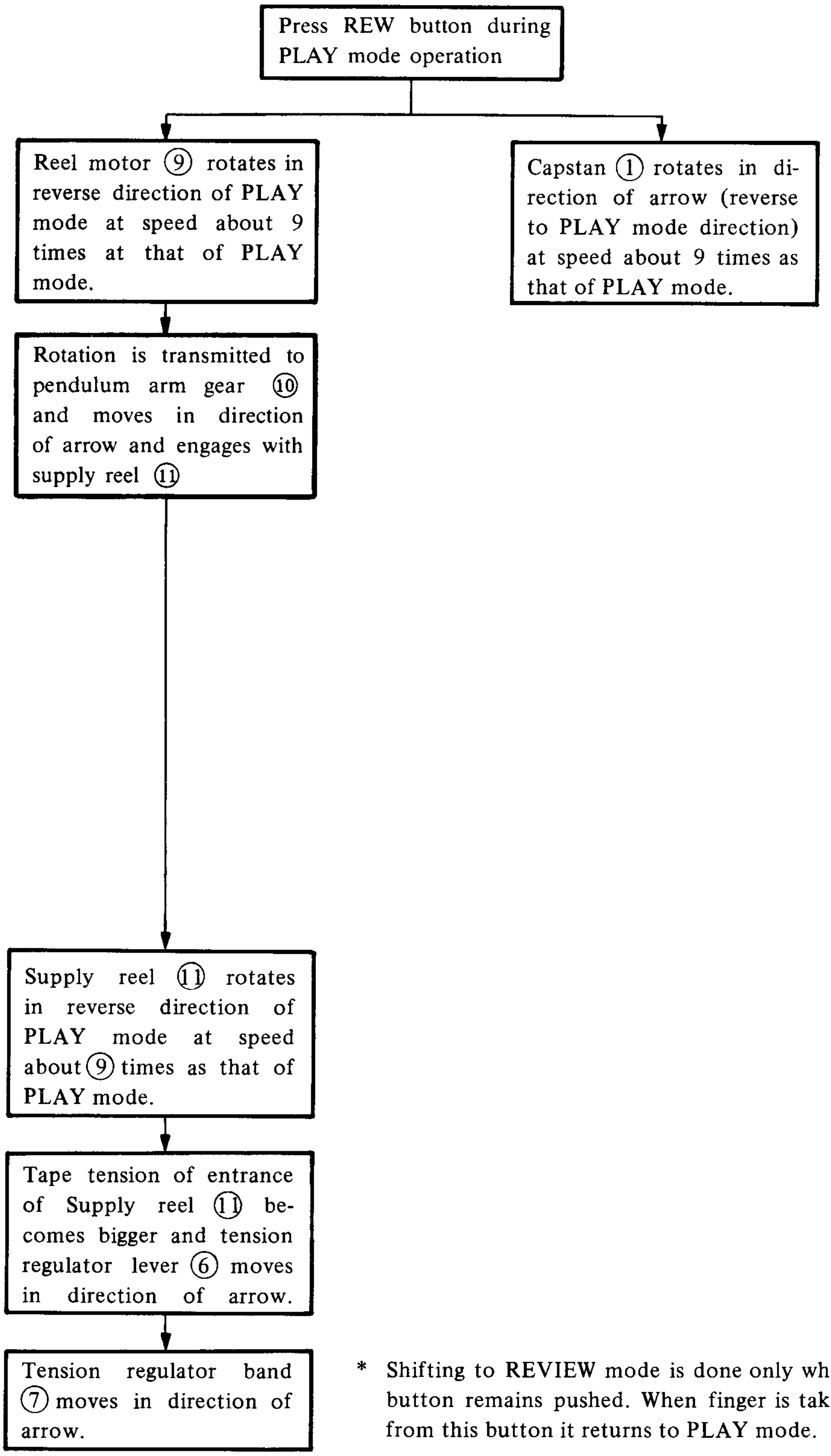
④

8-9. PICTURE SEARCH (REVIEW)

Vertical direction indicates time and arrow indicates operating sequence.



Press REW button during PLAY mode operation

Reel motor ⑨ rotates in reverse direction of PLAY mode at speed about 9 times at that of PLAY mode.

Capstan ① rotates in direction of arrow (reverse to PLAY mode direction) at speed about 9 times as that of PLAY mode.

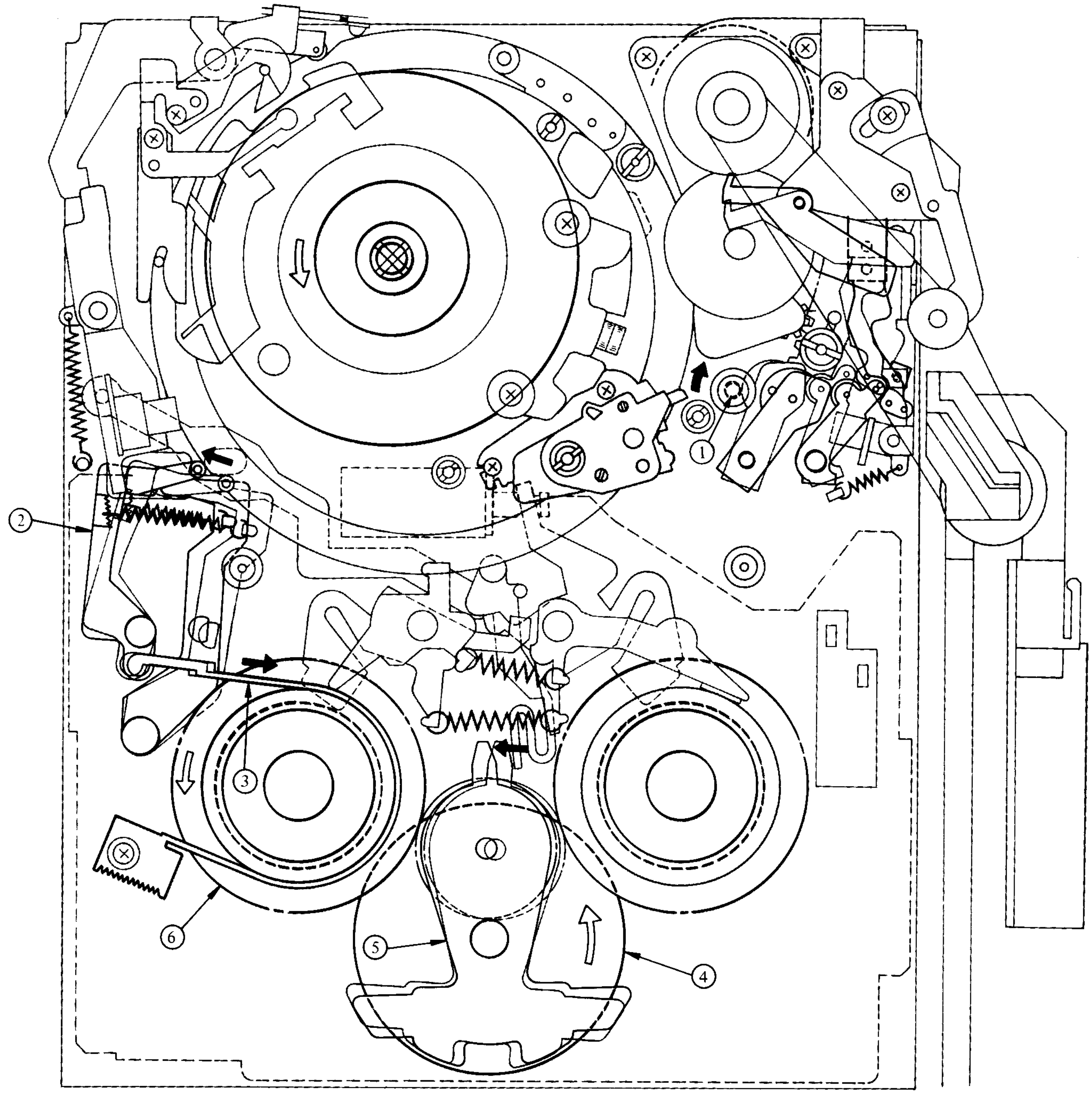
Rotation is transmitted to pendulum arm gear ⑩ and moves in direction of arrow and engages with supply reel ⑪

Supply reel ⑪ rotates in reverse direction of PLAY mode at speed about ⑨ times as that of PLAY mode.

Tape tension of entrance of Supply reel ⑪ becomes bigger and tension regulator lever ⑥ moves in direction of arrow.

Tension regulator band ⑦ moves in direction of arrow.

* Shifting to REVIEW mode is done only when this button remains pushed. When finger is taken out from this button it returns to PLAY mode.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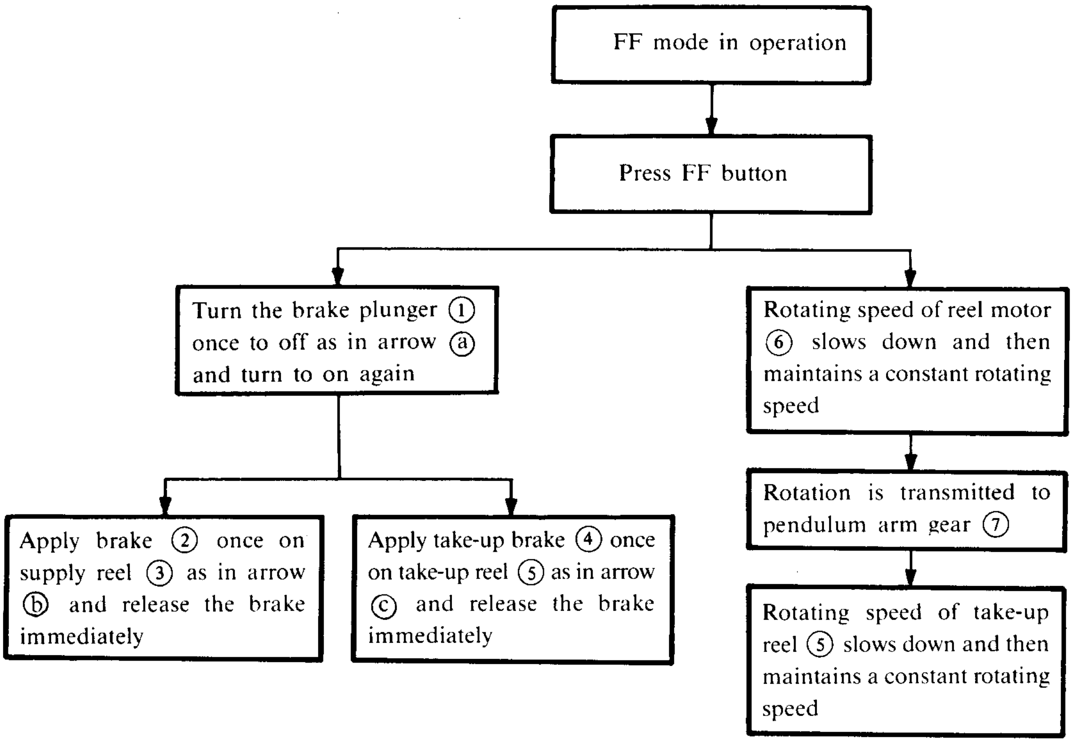
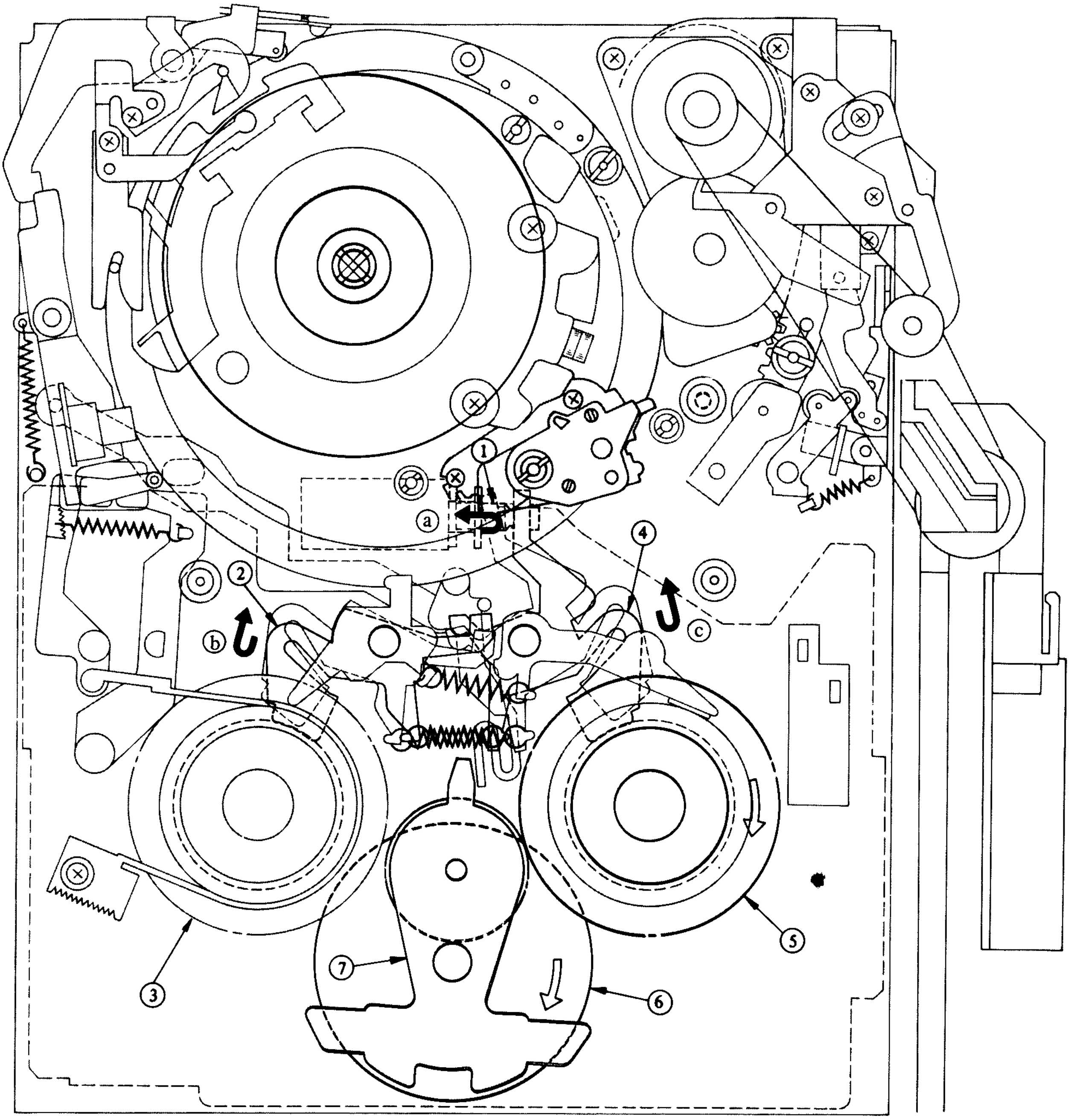
8-10. FR PICTURE SEARCH (CUE)

Vertical direction indicates time and arrow indicates operating sequence.


FF mode in operation
Press FF button
Turn the brake plunger ① once to off as in arrow ⓐ and turn to on again
Rotating speed of reel motor ⑥ slows down and then maintains a constant rotating speed
Rotation is transmitted to pendulum arm gear ⑦
Apply brake ② once on supply reel ③ as in arrow ⓑ and release the brake immediately
Apply take-up brake ④ once on take-up reel ⑤ as in arrow ⓒ and release the brake immediately
Rotating speed of take-up reel ⑤ slows down and then maintains a constant rotating speed

* Changes to this mode only when the FF button is being pressed.
When the finger is detached from the FF button, it returns to the FF mode.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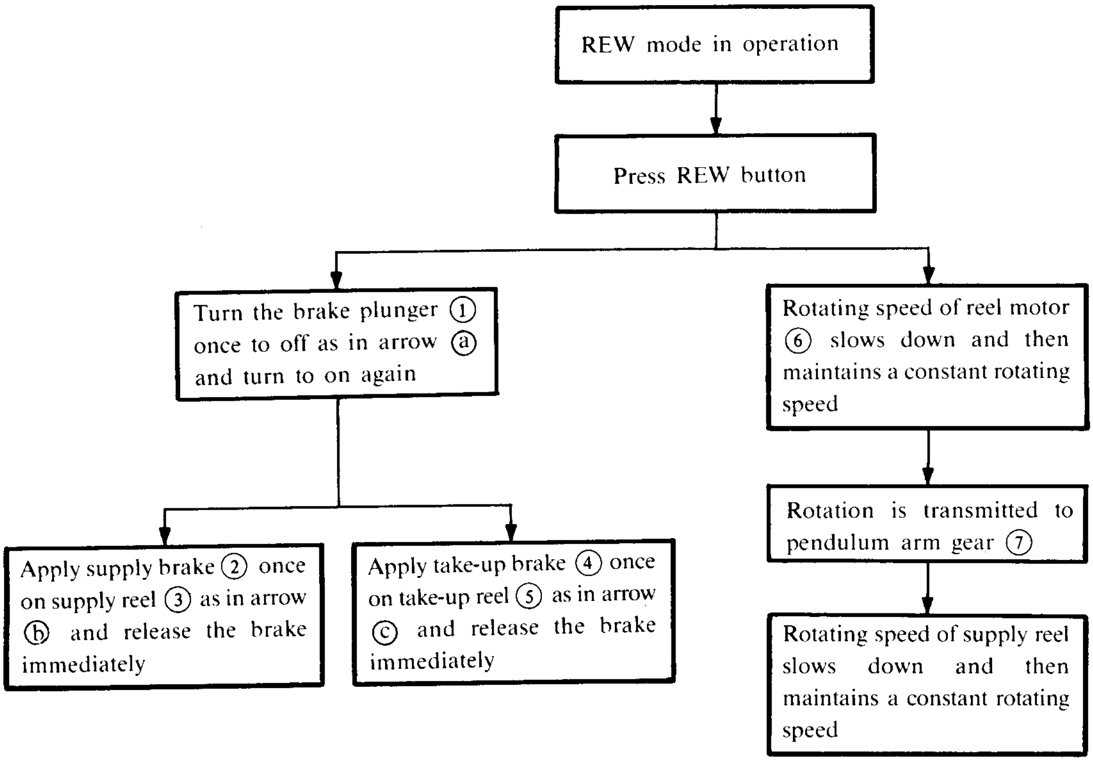
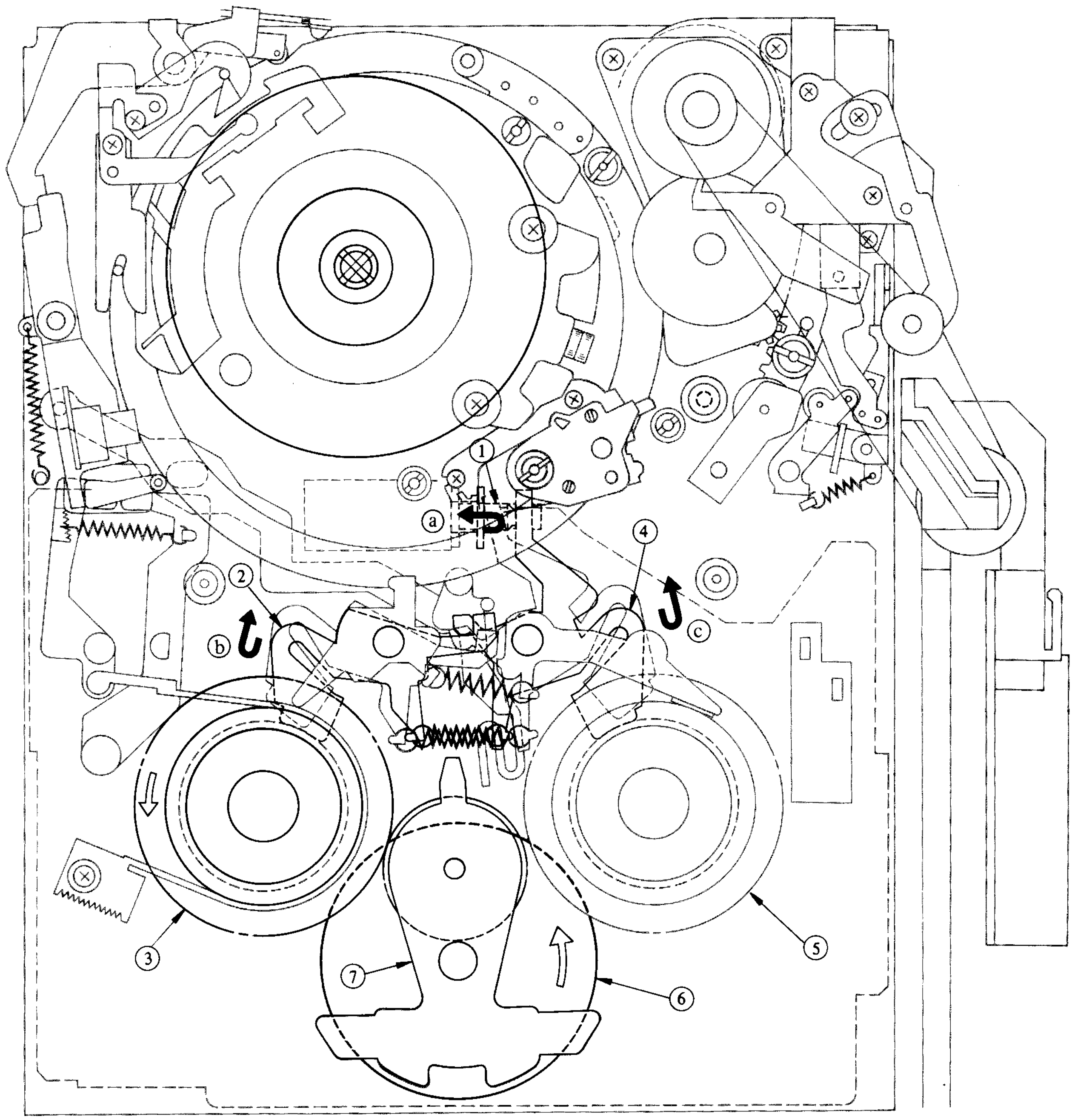
8-11 FR PICTURE RESEARCH (REVIEW)

Vertical direction indicates time and arrow indicates operating sequence.


REW mode in operation
Press REW button
Turn the brake plunger ① once to off as in arrow ⓐ and turn to on again
Rotating speed of reel motor ⑥ slows down and then maintains a constant rotating speed
Apply supply brake ② once on supply reel ③ as in arrow ⓑ and release the brake immediately
Apply take-up brake ④ once on take-up reel ⑤ as in arrow ⓒ and release the brake immediately
Rotation is transmitted to pendulum arm gear ⑦
Rotating speed of supply reel slows down and then maintains a constant rotating speed

* Shifting to REVIEW mode is done only when this button remains pushed. When finger is taken out from this button it returns to PLAY mode.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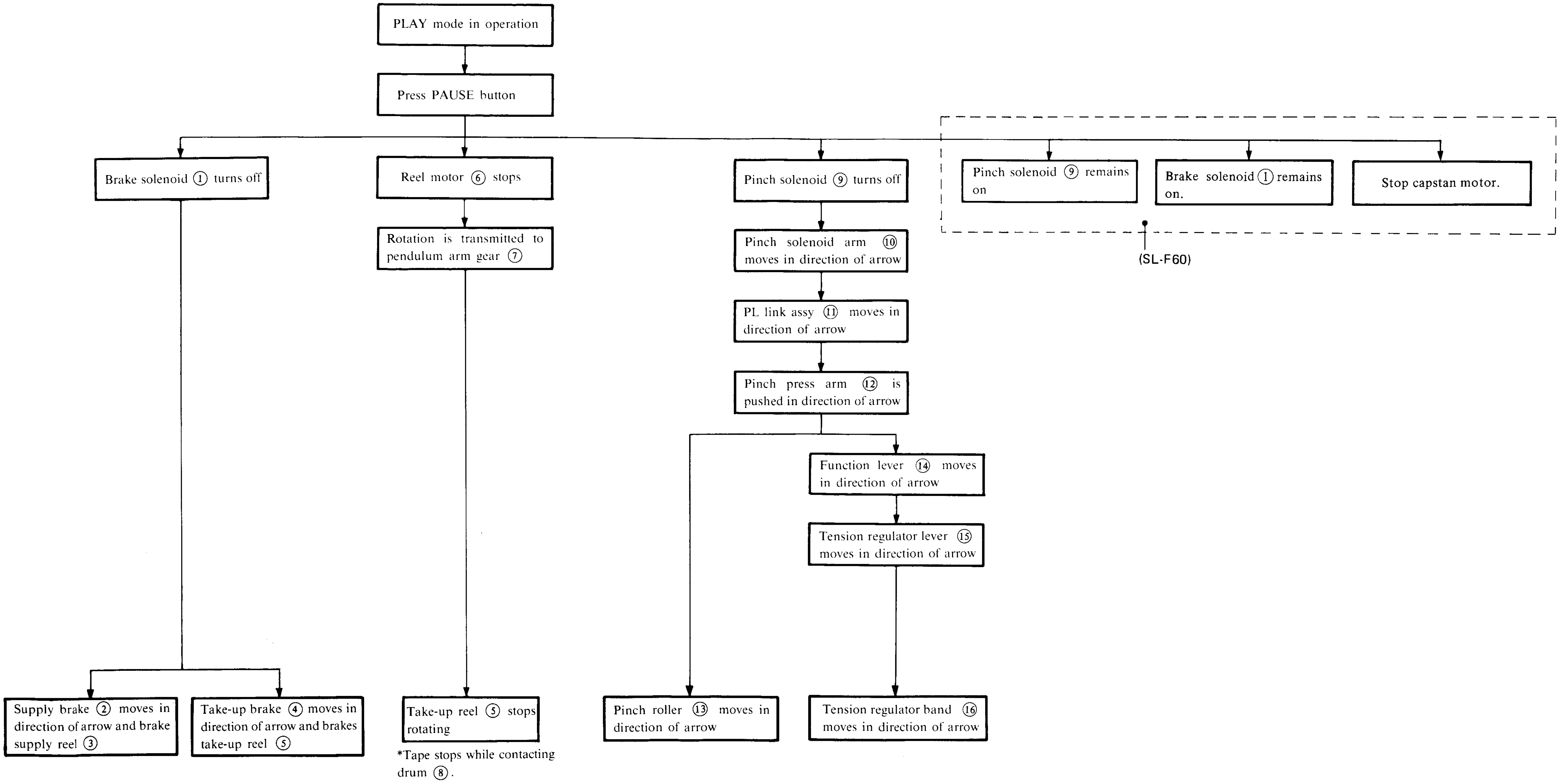
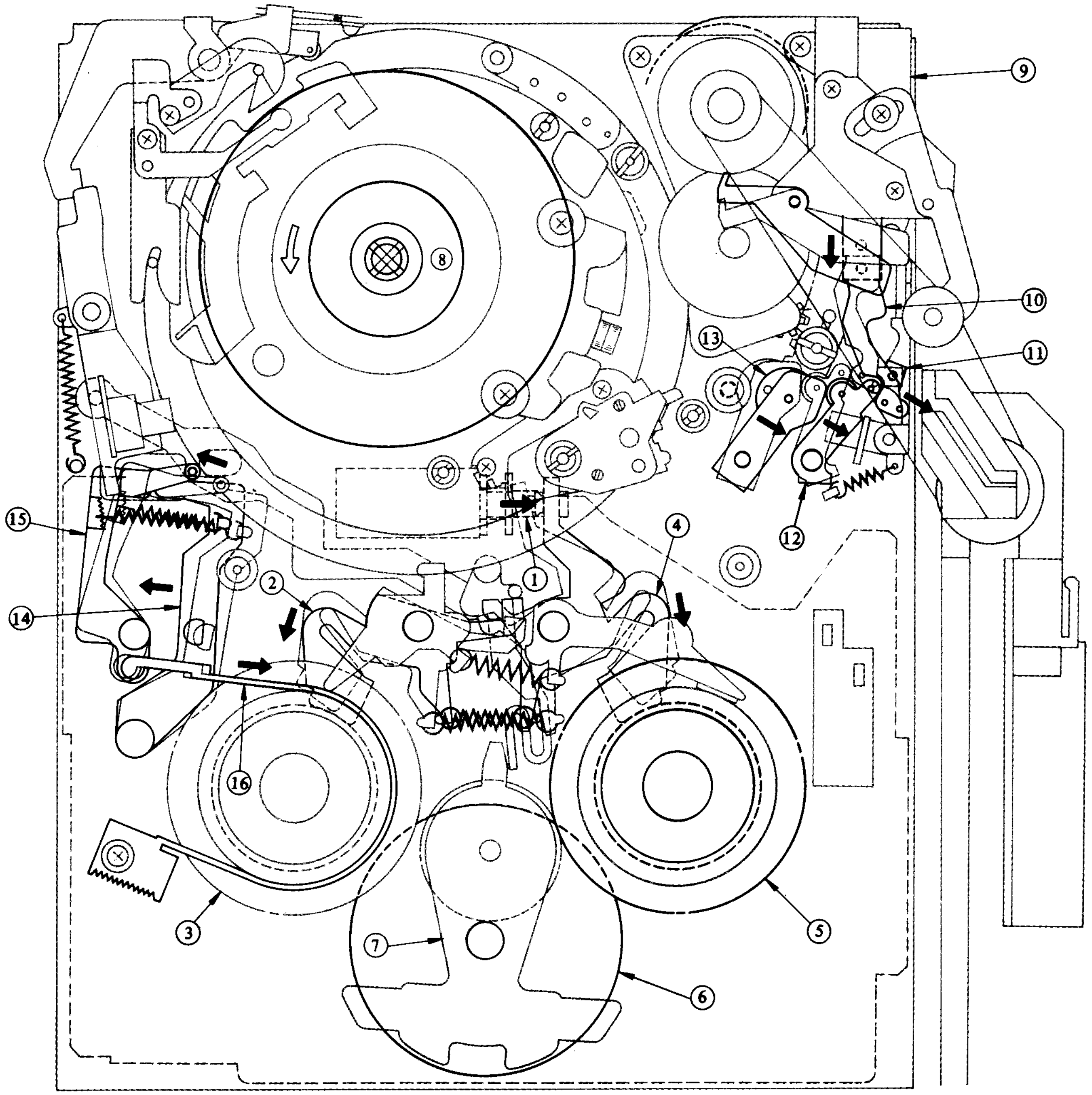
8-12. PAUSE (PLAY) MODE

Vertical direction indicates time and arrow indicates operating sequence.


PLAY mode in operation
Press PAUSE button
Brake solenoid ① turns off
Reel motor ⑥ stops
Pinch solenoid ⑨ turns off
Pinch solenoid ⑨ remains on
Brake solenoid ① remains on.
Stop capstan motor.
(SL-F60)
Rotation is transmitted to pendulum arm gear ⑦
Pinch solenoid arm ⑩ moves in direction of arrow
PL link assy ⑪ moves in direction of arrow
Pinch press arm ⑫ is pushed in direction of arrow
Function lever ⑭ moves in direction of arrow
Tension regulator lever ⑮ moves in direction of arrow
Supply brake ② moves in direction of arrow and brake supply reel ③
Take-up brake ④ moves in direction of arrow and brakes take-up reel ⑤
Take-up reel ⑤ stops rotating
*Tape stops while contacting drum ⑧.
Pinch roller ⑬ moves in direction of arrow
Tension regulator band ⑯ moves in direction of arrow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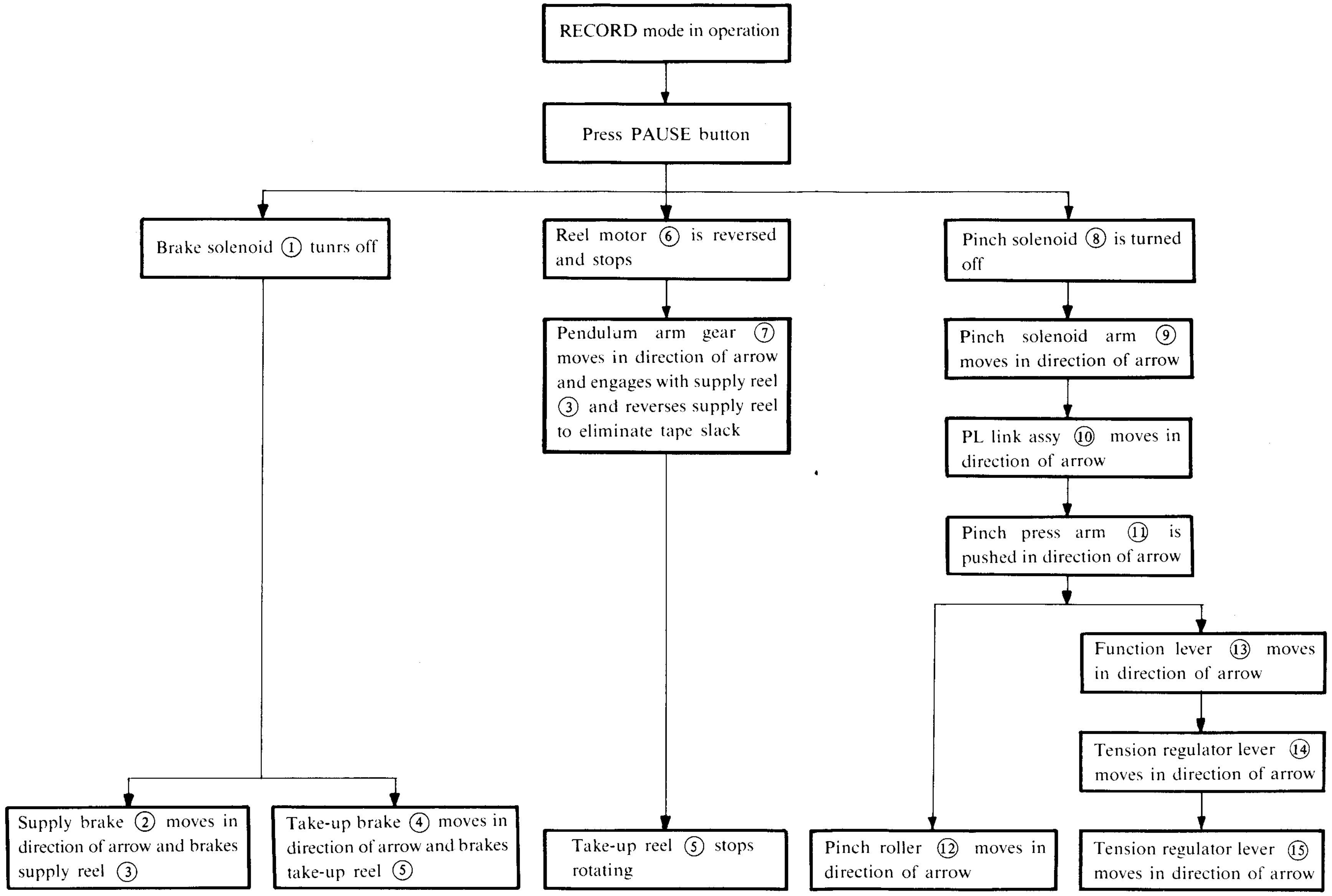
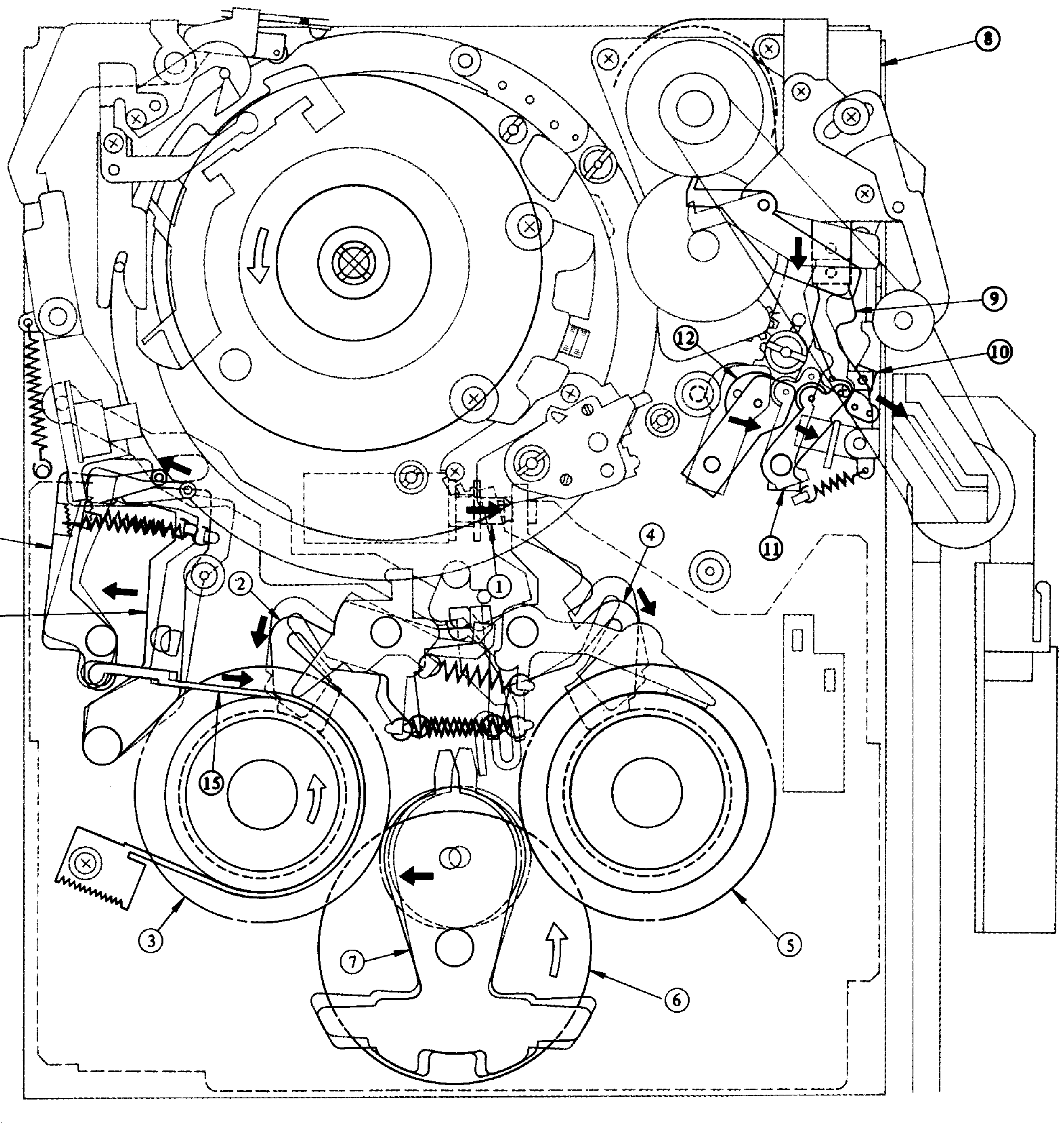
8-13. PAUSE (RECORD) MODE

Vertical direction indicates time and arrow indicates operating sequence.


RECORD mode in operation
Press PAUSE button
Brake solenoid ① tunrs off
Reel motor ⑥ is reversed and stops
Pinch solenoid ⑧ is turned off
Pendulum arm gear ⑦ moves in direction of arrow and engages with supply reel ③ and reverses supply reel to eliminate tape slack
Pinch solenoid arm ⑨ moves in direction of arrow
PL link assy ⑩ moves in direction of arrow
Pinch press arm ⑪ is pushed in direction of arrow
Function lever ⑬ moves in direction of arrow
Tension regulator lever ⑭ moves in direction of arrow
Supply brake ② moves in direction of arrow and brakes supply reel ③
Take-up brake ④ moves in direction of arrow and brakes take-up reel ⑤
Take-up reel ⑤ stops rotating
Pinch roller ⑫ moves in direction of arrow
Tension regulator lever ⑮ moves in direction of arrow

* F30 and F60 are same operation for REC PAUSE.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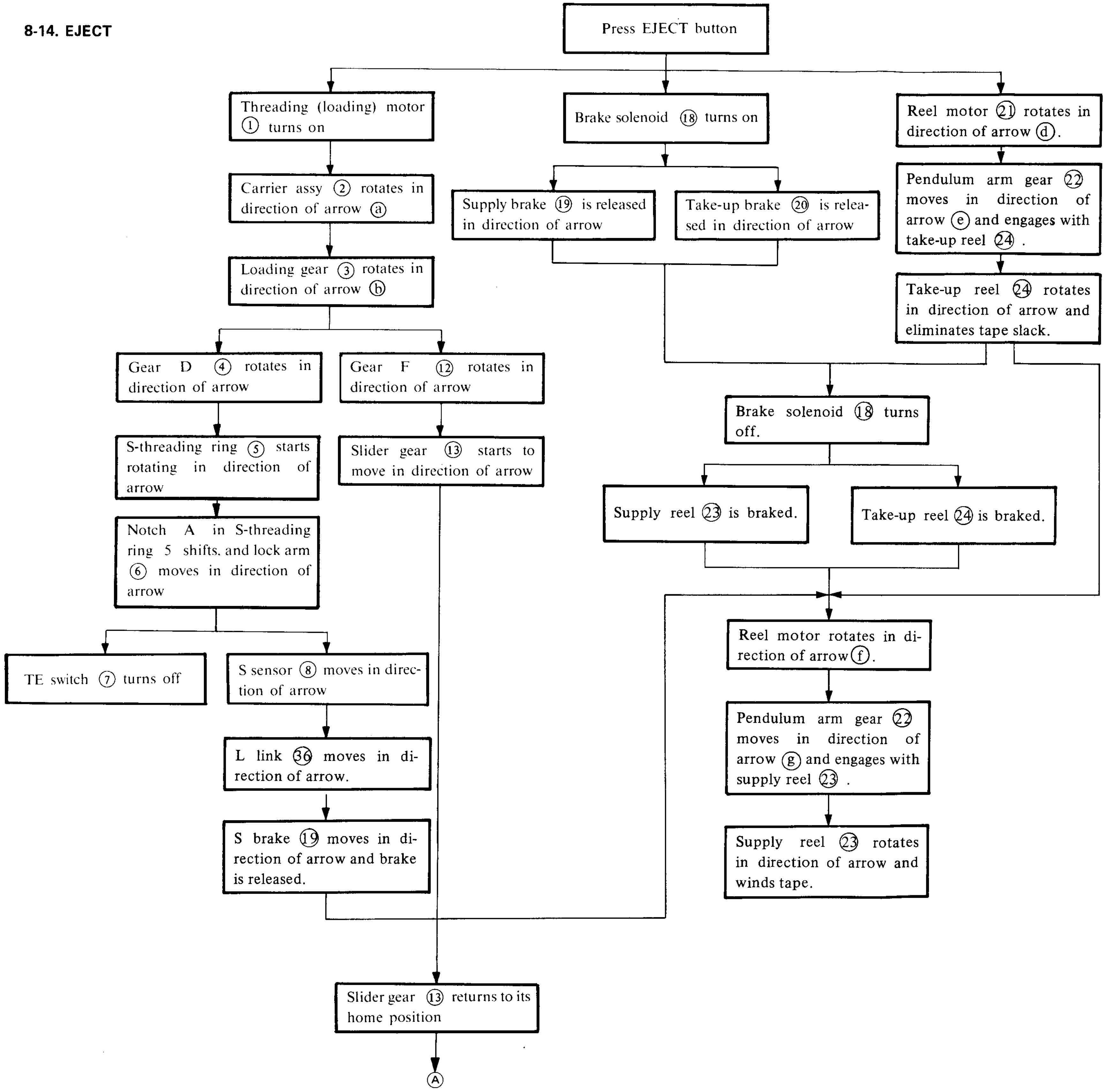
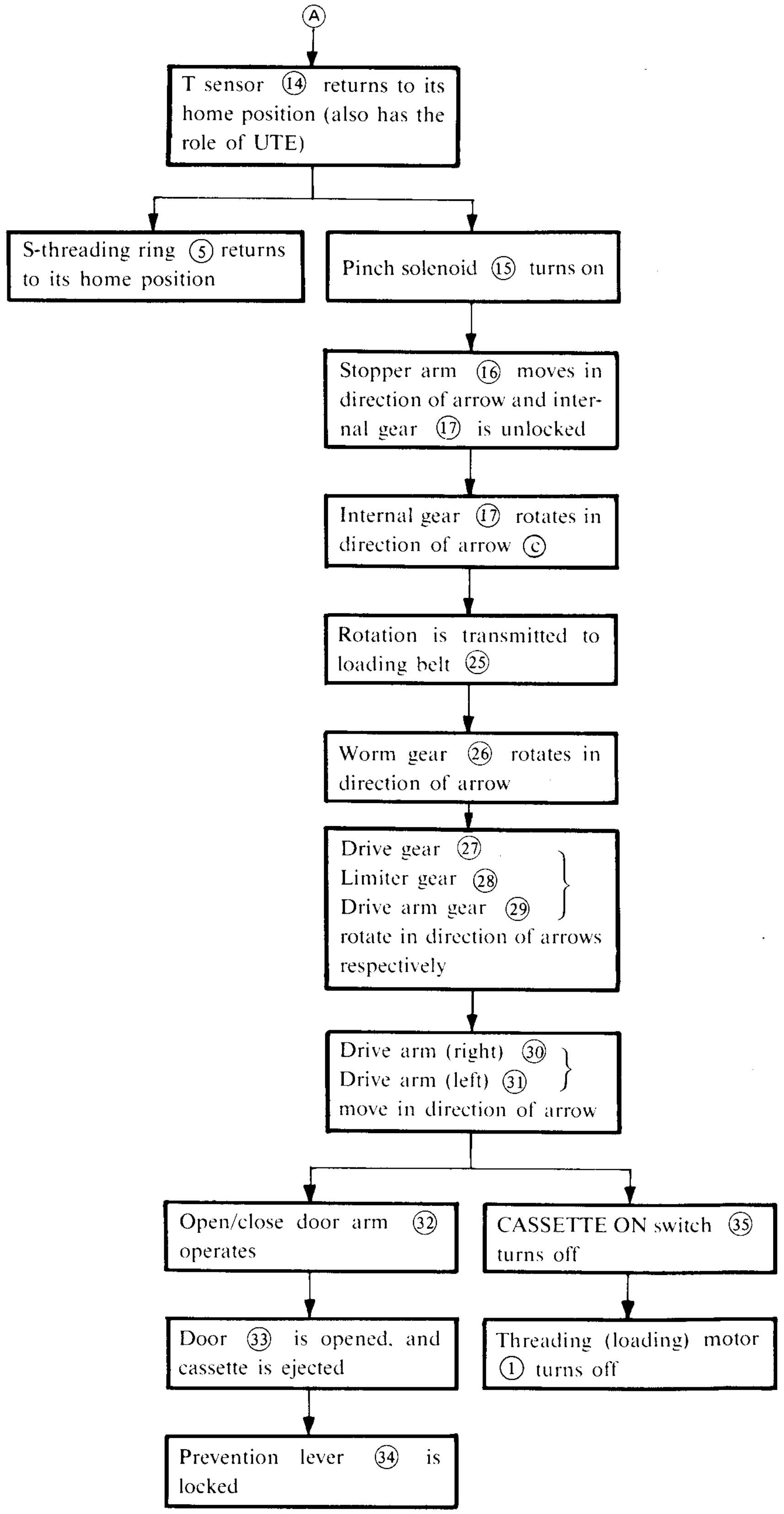
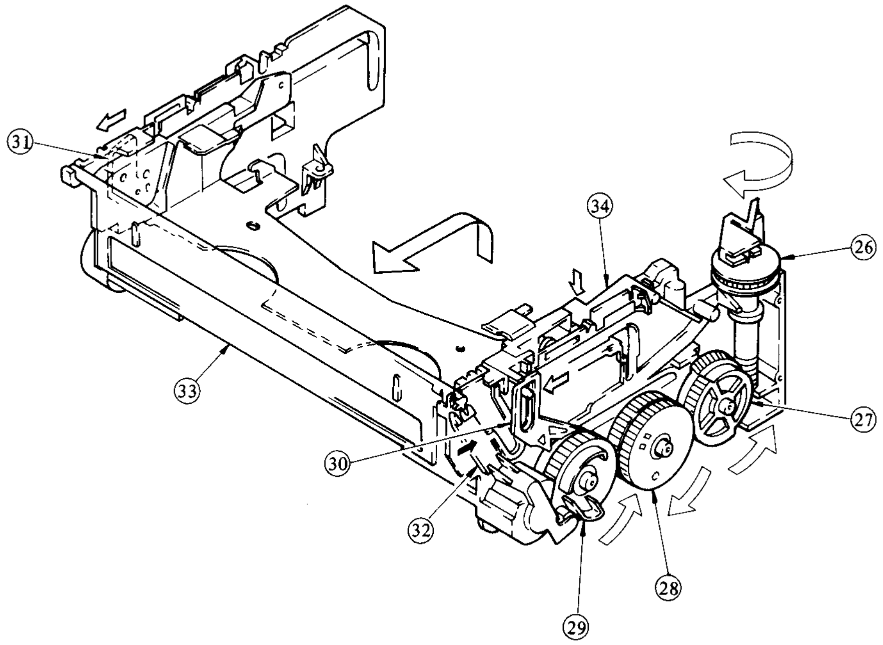
8-14. EJECT


Press EJECT button
Threading (loading) motor ① turns on
Brake solenoid ⑱ turns on
Reel motor ㉑ rotates in direction of arrow ⓓ.
Carrier assy ② rotates in direction of arrow ⓐ
Supply brake ⑲ is released in direction of arrow
Take-up brake ⑳ is released in direction of arrow
Pendulum arm gear ㉒ moves in direction of arrow ⓔ and engages with take-up reel ㉔.
Loading gear ③ rotates in direction of arrow ⓑ
Take-up reel ㉔ rotates in direction of arrow and eliminates tape slack.
Gear D ④ rotates in direction of arrow
Gear F ⑫ rotates in direction of arrow
Brake solenoid ⑱ turns off.
S-threading ring ⑤ starts rotating in direction of arrow
Slider gear ⑬ starts to move in direction of arrow
Supply reel ㉓ is braked.
Take-up reel ㉔ is braked.
Notch A in S-threading ring 5 shifts, and lock arm ⑥ moves in direction of arrow
Reel motor rotates in direction of arrow ⓕ.
TE switch ⑦ turns off
S sensor ⑧ moves in direction of arrow
Pendulum arm gear ㉒ moves in direction of arrow ⓖ and engages with supply reel ㉓.
L link ㊱ moves in direction of arrow.
S brake ⑲ moves in direction of arrow and brake is released.
Supply reel ㉓ rotates in direction of arrow and winds tape.
Slider gear ⑬ returns to its home position
Ⓐ

Vertical direction indicates time and arrow indicates operating sequence.


Ⓐ
T sensor ⑭ returns to its home position (also has the role of UTE)
S-threading ring ⑤ returns to its home position
Pinch solenoid ⑮ turns on
Stopper arm ⑯ moves in direction of arrow and internal gear ⑰ is unlocked
Internal gear ⑰ rotates in direction of arrow ⓒ
Rotation is transmitted to loading belt ㉕
Worm gear ㉖ rotates in direction of arrow
Drive gear ㉗
Limiter gear ㉘
Drive arm gear ㉙
rotate in direction of arrows respectively
Drive arm (right) ㉚
Drive arm (left) ㉛
move in direction of arrow
Open/close door arm ㉜ operates
CASSETTE ON switch ㉟ turns off
Door ㉝ is opened, and cassette is ejected
Threading (loading) motor ① turns off
Prevention lever ㉞ is locked



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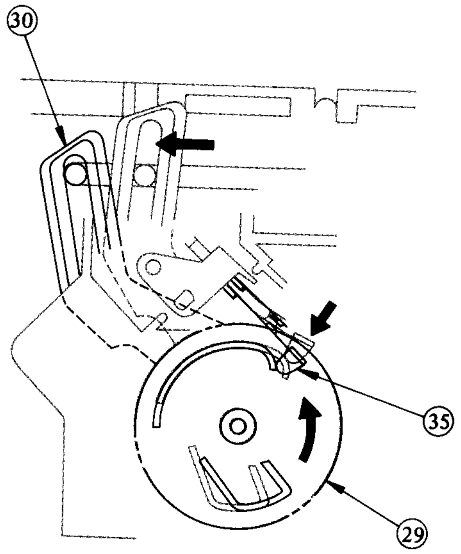

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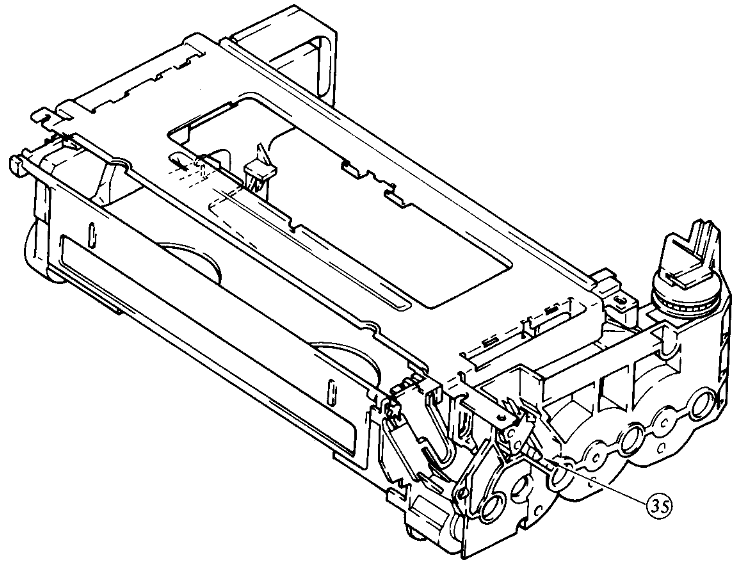

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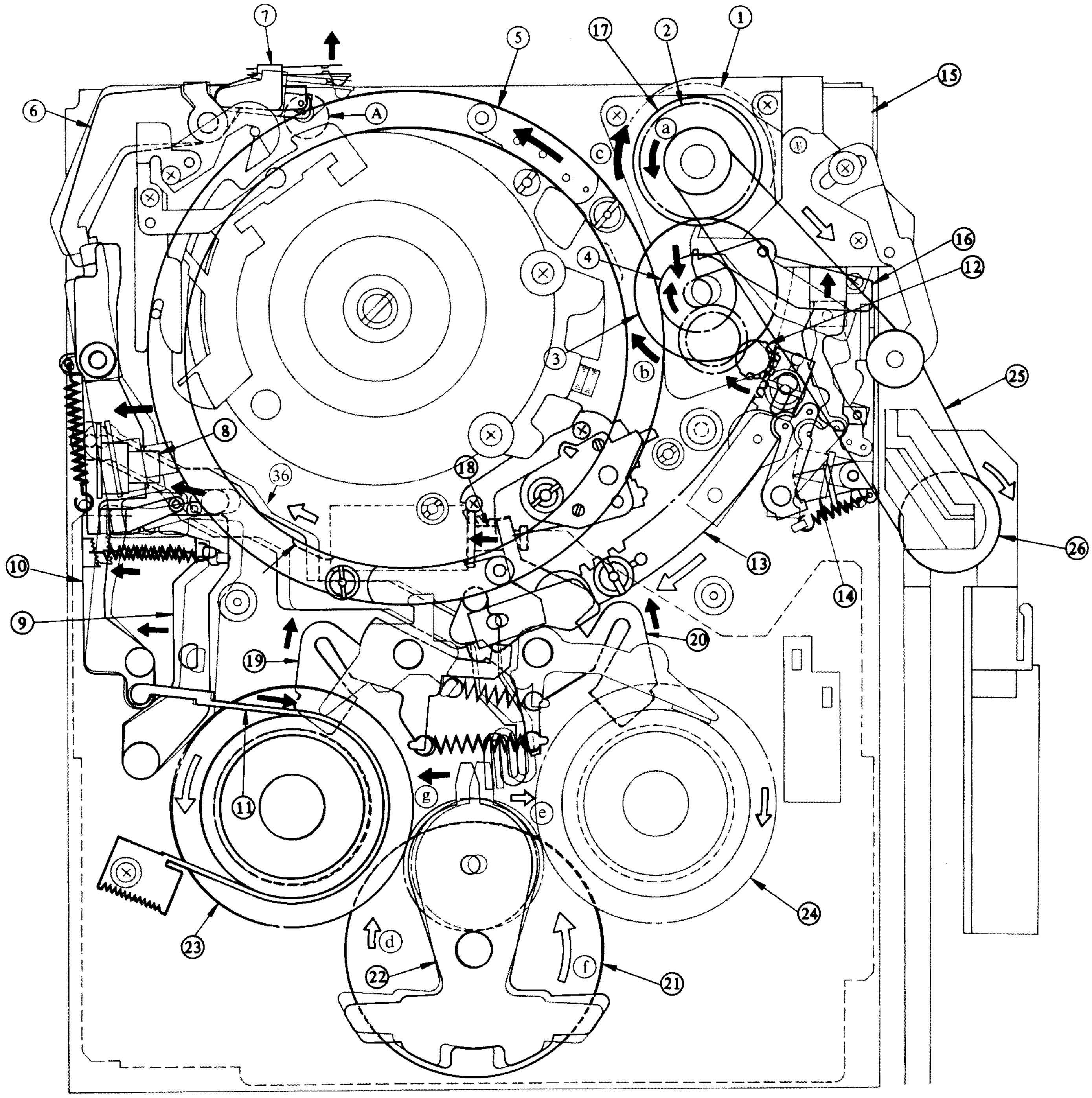

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8-15. MODE CHANGE CHART

Desired mode Current mode	▶ PLAY	▶▶ FF	◀◀ REW	● RECORD	❚❚ PAUSE	■ STOP	⏏ EJECT
▶ PLAY	–	PICTURE SEARCH (CUE)	PICTURE SEARCH (REVIEW)	–	PAUSE (PLAY)	STOP	EJECT
▶▶ FF	PLAY	FR PICTURE SEARCH (CUE)	REW	–	–	STOP	EJECT
◀◀ REW	PLAY	PICTURE SEARCH (CUE)	FR PICTURE SEARCH (REVIEW)	–	–	STOP	EJECT
● RECORD	–	–	–	–	PAUSE (RECORD)	STOP	–
❚❚ SL-F30/T25 PAUSE (PLAY)	–	PICTURE SEARCH (CUE)	PICTURE SEARCH (REVIEW)	PAUSE (RECORD)	PLAY	STOP	EJECT
❚❚/▶◀ SL-F60 PAUSE (PLAY)	–	PICTURE SEARCH (CUE)	PICTURE SEARCH (REVIEW)	PAUSE (RECORD)	PLAY	STOP	EJECT
❚❚ PAUSE (RECORD)	–	–	–	–	RECORD	STOP	EJECT
■ STOP	PLAY	FF	REW	RECORD ★	–	–	EJECT

★ When the non-erase tab on the rear of the cassette is broken, it shifts to eject mode.